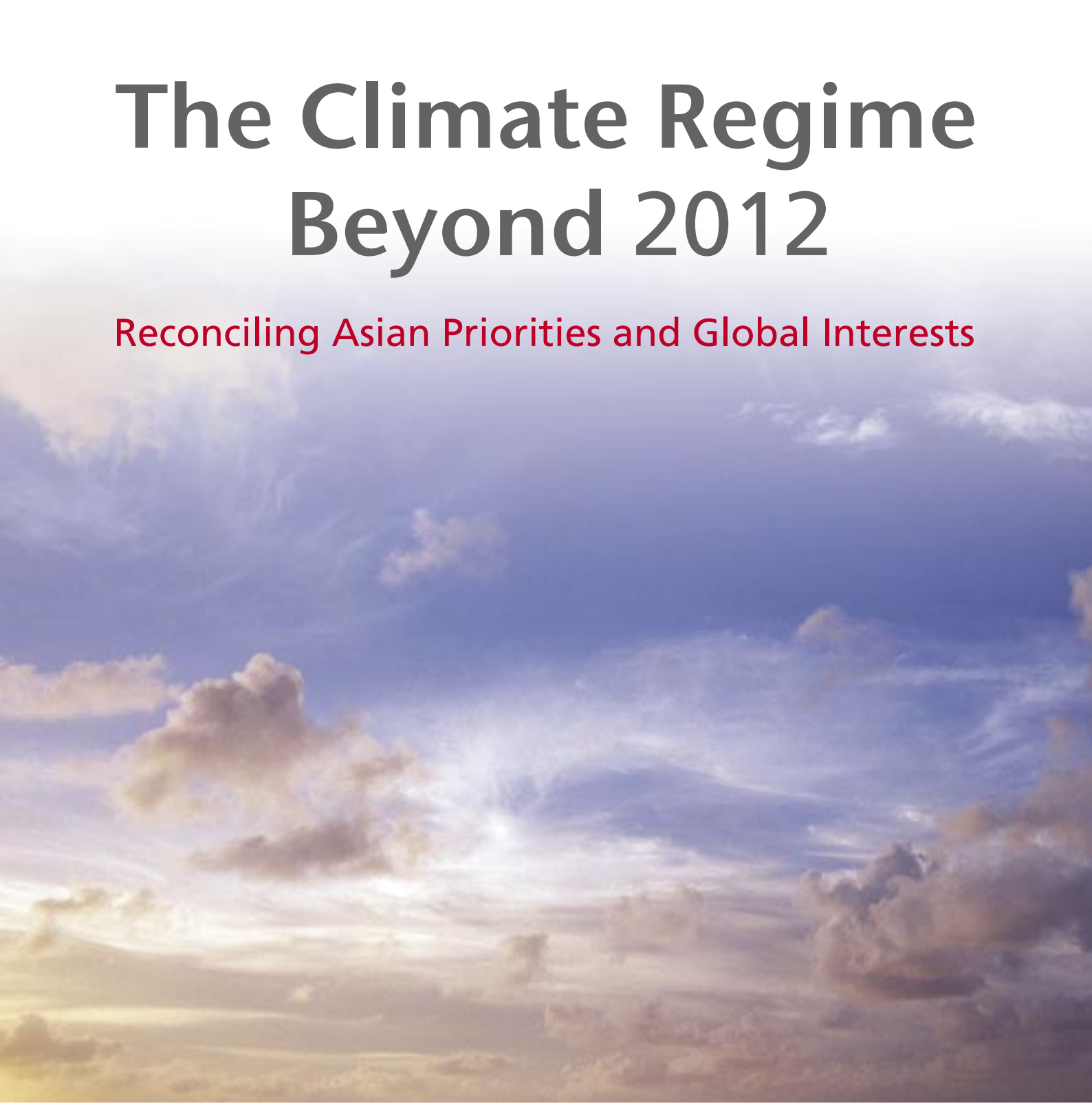
The Climate Regime Beyond 2012

Reconciling Asian Priorities and Global Interests



IGES
Institute for Global Environmental Strategies

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Reconciling Asian Developmental Priorities and Global Climate Interests

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Editor

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Foreword

The year 2007 is likely to be remembered as the year of "climate change", as it received considerable attention worldwide with the awarding of the Nobel Peace Prize to the Intergovernmental Panel on Climate Change (IPCC), which published its fourth Assessment Report (AR4). The AR4 highlighted the adverse impacts of climate change in the Asia-Pacific region. However, owing to competing priorities such as poverty alleviation, health and education, policymakers in most of the countries in the region have not yet considered the issue seriously in national development planning.

International discussions on climate regime are progressing steadily under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. Indeed, the "Bali Action Plan", agreed upon at the 13th Conference of the Parties (COP 13) and the 3rd Meeting of the Parties to the Kyoto Protocol (MOP3) held in Bali, Indonesia in December 2007, is an important milestone. The Bali Action Plan specifies the modalities and guiding principles for the negotiation of an agreement by 2009 to mitigate greenhouse gas emissions and adapt to climate change impacts for the period after 2012 when the first commitment period of the Kyoto Protocol expires. However, there is a widespread feeling among Asian stakeholders that the current climate regime does not adequately address Asian 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) has been organising a series of national, sub-regional and region-wide consultations since 2005. Based on the first two rounds of consultations in 2005 and 2006, two reports were published, and they were well-received by stakeholders in the region as well as by international climate negotiators. The third round of consultations was held in New Delhi (29-30 August 2007) and Beijing (13-14 September 2007), where four specific themes of importance to the region and the future climate regime – sectoral approaches, technology development and transfer, adaptation financing and mainstreaming, and developmental co-benefits of climate actions – were discussed. This report summarises the findings from the third round of consultations.

While the decision to conduct the consultations was entirely that of IGES, the task would not have been possible without cooperation from several partner organisations in the region. I would especially like to thank the staff of 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 over the next two years. IGES welcomes comments on the report regarding the improvements that should be considered in the future.

Prof. Hironori Hamanaka
Chair of the Board of Directors
Institute for Global Environmental Strategies (IGES)

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Abbreviations and Acronyms

AAU	Assigned Amount Units
ADB	Asian Development Bank
AF	Adaptation Fund
AfDB	African Development Bank
AHP	Analytic Hierarchy Process
AIDS	Acquired Immuno-Deficiency Syndrome
AIM	Asia-Pacific Integrated Model
AOSIS	Alliance of Small Island States
APEC	Asia-Pacific Economic Cooperation
APERC	Asia Pacific Energy Research Centre
APP	Asia-Pacific Partnership on Clean Development and Climate
AWG	Ad-hoc Working Group of Parties
ASEAN	Association of South East Asian Nations
BASIC	Building and Strengthening Institutional Capacity
Btu	British thermal unit
CBD	Convention on Biological Diversity
CCAP	Center for Clean Air Policy, USA
CCD	Convention to Combat Desertification
CCS	Carbon Capture and Storage
CDCF	Community Development Carbon Fund
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board
CDQ	Coke Dry Quenching
CDT	Climate-wise Development Treaty
CEIF	Clean Energy Investment Framework
CER	Certified Emission Reductions
CFC	Chlorofluorocarbon
CGIAR	Consultative Group on International Agricultural Research
CISA	Chinese Iron and Steel Association
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
COP	Conference of the Parties
COSI	Carbon Offset Sustainability Indicator
CRYSTAL	Community-based Risk Screening Tool - Adaptation and Livelihoods
CSD	Commission on Sustainable Development
CSLF	Carbon Sequestration Leadership Forum
CTI	Climate Technology Initiative
DFID	Department for International Development
DNA	Designated National Authority
DOE	Department of Energy, USA
EB	Executive Board
ecbi	European capacity building initiative
EGTT	Expert Group on Technology Transfer
EIA	Energy Information Administration
ENB	Earth Negotiations Bulletin
EPA	Environmental Protection Agency, USA
ERC	Emission Reduction Credits
ERI	Energy Research Institute, China
ERU	Emission Reduction Units
EU	European Union
EU-ETS	European Union Emissions Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
G20	Group of Twenty
G-77/China	Group of 77 and China
G8	Group of Eight
GCI	Global Commons Institute
GCP	Global Carbon Project
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEM	Group of Emissions Markets
GFDRR	Global Facility for Disaster Reduction and Recovery
GGFR	Global Gas Flaring Reduction Partnership
GHG	Greenhouse Gas
GIRIF	Global Index Reinsurance Facility
GISS/NASA	Goddard Institute for Space Studies/ National Aeronautics and Space Administration
GLOF	Glacial Lake Outburst floods
GNI	Gross National Income
GNP	Gross National Product
GRI	Global Reporting Initiative
Gt	Giga tonne
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HCFC	Hydrochlorofluorocarbon
HDI	Human Development Index
HFCs	Hydrofluorocarbons
HIV	Human Immuno Deficiency Virus
IAs	Implementing Agreements
IATAL	International Air Travel Adaptation Levy
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
ICCTF	International Climate Change Task Force
IDA	International Development Association
IDS	Institute of Development Studies
IEA	International Energy Agency
IES	Integrated Environmental Strategies
IFC	International Finance Corporation
IGCC	Integrated Gasification Combined Cycle
IIASA	International Institute for Applied Systems Analysis
IISD	International Institute for Sustainable Development
IISI	International Iron and Steel Institute
IMF	International Monetary Fund
IMO	International Maritime Organization

IPCC	Intergovernmental Panel on Climate Change
IPHE	International Partnership for the Hydrogen Economy
IPR	Intellectual Property Rights
ISDR-AP	International Strategy for Disaster Reduction Asia & Pacific
ITTO	International Tropical Timber Organization
JBIC	Japan Bank for International Cooperation
JI	Joint Implementation
JICA	Japan International Cooperation Agency
LDCF	Least Developed Countries Fund
LDCs	Least Developed Countries
LULUCF	Land-Use, Land-Use Change and Forestry
M2M	Methane to Markets Partnership
MDGs	Millennium Development Goals
MEA	Multilateral Environmental Agreements
METI	Ministry of Economy, Trade and Industry, Japan
MLF	Multilateral Fund for the Implementation of the Montreal Protocol
MNCs	Multinational Corporations
MOEJ	Ministry of the Environment of Japan
MOP	Meeting of the Parties (to the Kyoto Protocol)
MW	Megawatt
NAPA	National Adaptation Programmes of Action
NCCP	National Climate Change Programme
NDRC	National Development and Reform Commission
NEAP	National Environmental Action Plan
NEPA	National Environmental Protection Agency
NGO	Non-Governmental Organisation
NSSD	National Strategy for Sustainable Development
NWP	Nairobi Work Programme on Impacts, Vulnerability and Adaptation
ODA	Official Development Assistance
ODI	Overseas Development Institute
ODS	Ozone Depleting Substances
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
PAMs	Policies and Measures
PDD	Project Design Document
ppmv	parts per million by volume
PPP	Purchasing Power Parity
PPP	Polluters Pay Principle
PRSPs	Poverty Reduction Strategy Papers
PSSD	Philippines Strategy for Sustainable Development
R&D	Research and Development
RE	Renewable Energy
REDD	Reduce Emissions from Deforestation and Degradation
RMU	Removal Unit
RPS	Renewable Portfolio Standard
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SD	Sustainable Development
SD-PAMs	Sustainable Development Policies and Measures
SIDS	Small Island Developing States
SPA	Special Priority on Adaptation of the Global Environment Facility
TERI	The Energy and Resources Institute, India
TRIPS	Trade-Related Aspects of Intellectual Property Rights Agreement of the World Trade Organisation
TT:CLEAR	Technology Information Clearing House
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP/RISO	United Nations Environmental Programme/Risoe Centre, Denmark
UNFCCC	United Nations Framework Convention on Climate Change
UNU-IAU	United Nations University-Institute for Advanced Studies
VARG	Vulnerability and Adaptation Research Group
VER	Voluntary Emission Reduction
WBCSD	World Business Council for Sustainable Development
WDI	World Development Indicators
WI	Worldwatch Institute
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development
WTO	World Trade Organisation
ZETT	Zero-Emission Technology Treaty

Executive Summary

1. Since 2005, the Institute for Global Environmental Strategies (IGES) has organised three rounds of stakeholder consultations in Asia at the national, sub-regional and regional levels. The consultations held in 2005 solicited concerns, interests and priorities of various Asian countries for the future climate regime, while those held in 2006 examined whether various proposals for the post-2012 climate regime adequately addressed developmental concerns and aspirations of developing Asia. The outcomes of both rounds of consultations were published and posted on the IGES web site and disseminated at previous meetings of the Conferences of the Parties (COP) to the UNFCCC and the Commission on Sustainable Development.

2. The third round of consultations was held in New Delhi and Beijing in 2007. The aim of these consultations, supplemented by questionnaires and interviews with key informants and literature reviews, was to find ways to reconcile Asian developmental priorities identified in earlier rounds of consultations with global climate protection interests, and to bridge gaps in the perspectives of developed and developing countries on four themes related to post-2012 climate regime – sectoral approaches, technology cooperation, adaptation financing and mainstreaming, and developmental co-benefits of climate actions. The perspectives of developing Asia on the future climate regime were also examined.

3. Participating stakeholders in both China and India reaffirmed their interest in accelerating their countries' transition towards a low-carbon economy in the long run, but stressed that the future regime should not constrain sustainable development in developing Asia. A few participants stressed that the design of the future regime should aim to change energy-intensive lifestyles and consumption patterns, and consider a new set of carbon standards to promote such a transition in all countries. Participants underscored the need for (a) ambitious targets for the reduction of GHG emissions by developed countries based on the principles of historical responsibility and capability; and (b) preferential support for climate actions that are consistent with economic and social development in developing Asia.

4. A few participants suggested that the future climate regime should focus on mitigation, adaptation, technology and financing in a more balanced manner than before and that developing Asia would prefer a whole package of measures rather than focusing exclusively on mitigation targets. It was also recommended that implications of the various post-2012 climate regime proposals and targets (e.g. 50% GHG reduction by 2050) on future prospects for development of various Asian countries should be examined thoroughly. Other participants argued that international commitments based on energy intensity may not necessarily serve the interests of developing Asia due to difficulties in predicting the future growth rates of different sectors and their shares of GDP, and due to close links between energy intensities and natural resource endowments in particular economies.

5. Participants emphasised that the climate change regime should provide credible policy signals to enable long-term low-carbon investments in developing Asia, and that the basic principles (e.g. common but differentiated responsibilities) underpinning the current climate regime should

continue to be applied to the future regime. Participants called for a regime that adequately recognises domestic climate policies and measures taken in developing Asia, including financial investments in energy conservation and renewable energy, promotion of clean development mechanism (CDM) projects, and the creation of domestic institutions that would strengthen carbon trading and adaptation in the future.

6. Participants noted that market mechanisms such as CDM are beginning to have a positive impact on developing Asia and argued for the reform of the carbon market through simplified methodologies and the inclusion of additional sectors at the international level. At the national level, participants stressed the need for developing transparent information systems for enterprises and for strengthening the laws governing emission reduction purchase agreements. A few participants noted that the Asian private sector should play a much greater role in GHG mitigation, and that multi-national corporations (MNCs) operating in developing Asia could take the lead in such efforts by agreeing to cross-national binding emission reduction targets.

7. Participants agreed that sectoral approaches offer a promising way to reduce GHG emissions while aligning with developmental policies in industrial and land use sectors in developing Asia. Providing incentives and encouraging developing country goals within a framework of cooperation across key sectors could reduce transaction costs, accelerate transfer and deployment of low-carbon technologies and broaden the participation of countries. However, several policy and technical challenges, especially for crediting purposes, must be addressed to smooth the implementation of sectoral approaches. A few participants cautioned that sectoral approaches could only be a part of a solution and stressed the need to continue to pursue economy-wide reductions in the Kyoto Protocol.

8. Participants underscored the need for flexibility and diversity in choosing sectors, as harmonisation of intensity targets and other benchmarks within and across countries remain a major challenge. Sectoral approaches may be most successful if applied first in sectors that cater principally to domestic markets. In sectors that serve international markets, trans-national targets set by MNCs and industrial associations may succeed. In developing Asia, coal-fired electricity generation, iron and steel, cement and forest conservation appear to be good candidates for the sectoral approach, although specific challenges remain in each sector.

9. Participants highlighted the importance of carefully designing sectoral approaches to address concerns related to international competitiveness, environmental integrity and cost effectiveness. Effective integration in a post-2012 climate regime requires considerable progress on at least three fronts: (a) step-wise institutionalisation at both national and international levels, (b) preferential support and reliable incentives, and (c) sector-specific initiatives by MNCs. Collecting valid data from the energy emissions and technology standpoints to develop sector-specific benchmarks and performance indicators, building synergies between the UNFCCC and other initiatives, and accumulating useful lessons from programmatic CDM are crucial to moving forward with the implementation of sectoral approaches in Asia.

10. Participants stressed that progress in development, transfer and deployment of low-carbon technologies in developing Asia remains far below the levels required to change the GHG emissions growth trajectory in the region, and that the current climate regime has had only a marginal influence on current emission trends. A few participants noted the need for channelling more sustained investments into research, development and deployment of low-carbon technologies based on natural resource endowments of developing Asia, and suggested that the future regime must be aligned with the long-term business investment cycles so that investments can be justified commercially.

11. Participants noted that further progress in the rapid uptake of low-carbon technologies would be feasible in developing Asia if the future climate regime can improve finance to accelerate technology cooperation, promote synergies between technology initiatives within and outside the climate regime, and enhance the flexibility of the intellectual property rights (IPR) regime for low-carbon technologies. It was stressed that the post-2012 regime should consider political feasibility (in terms of the self-enforceability, the provision of side-payments, the fit with domestic interests and domestic institutional arrangements) of technology-oriented proposals, paying particular attention to the interests and capacity of sub-national governments. The provision of preferential incentives for national and sub-national initiatives that are intended to facilitate the transition to low-carbon pathways in developing Asia was also highlighted as being important.

12. To enhance total investments and financial flows in the development and deployment of low-carbon technologies, both creating a global research and development (R&D) fund and linking financial contributions with emissions reduction commitments have some merits, but the provision of side-payments (e.g. granting preferential treatment to companies based in donor countries) might enhance their political feasibility. The creation of venture capital funds for nearly commercialised technologies in developing Asia was also suggested. Likewise, making non-UNFCCC project activities with significant technology components eligible for preferential treatment under the CDM would help to take advantage of domestic interests and institutional infrastructure in developing Asia. However, expansion of the scope of CDM would obviously require deeper emission cuts by developed countries and an effective enforcement mechanism.

13. Participants affirmed that the future climate regime should create additional incentives for countries willing to move towards low-carbon technology pathways and adopt international technology standards. Compulsory licensing of high priority technologies may be considered along the lines of initiatives such as the US Clean Air Act but it is critically important to assess whether and to what extent IPRs are barriers to technology transfer depending on the stage of technology development or the nature of the technology itself. A domestic policy push including specification of contemplated climate actions by public authorities to the private sector, a flexible IPR regime, administrative coherence within developing countries and incentives from developed countries are all crucial to making vertical and horizontal technology deployment economically and politically feasible.

14. Participants stressed that mainstreaming adaptation concerns into development planning and assistance and financing of adaptation deserve the highest attention from Asian policymakers and negotiators. The progress in mainstreaming was very slow in many Asian countries, due to several institutional, informational, participatory and incentive-related barriers. Participants suggested that the future climate regime should facilitate mainstreaming by providing practical examples, improving capacities and requiring all development policies undergo an "adaptation check". Creation of effective incentive schemes at various levels was considered crucial for mainstreaming adaptation.

15. Participants noted that very few of the post-2012 climate regime proposals can raise sufficient funds to meet the costs of adaptation in developing Asia. Hence, options for mobilising new and additional financial resources for adaptation both within and outside UNFCCC must be explored based on the "polluter pays" and "climate change winners pay" principles. It was suggested that public resources at national and international levels must play a larger role in financing initially, while gradually encouraging the private sector to become more proactively involved in adaptation efforts. The need for (a) building synergies of adaptation plans with disaster risk management and MDG achievement plans, (b) developing flexible, customised credit schemes including microfinance and (c) providing alternative climate-insensitive income generating activities in Asia was highlighted.

16. The role of the insurance sector in facilitating adaptation to climate change in developing Asia has been minimal so far due to barriers such as a lack of relevant information on climate risks at the local level. However, the demand for weather-related insurance instruments is expected to increase as climate change proceeds. Robust insurance mechanisms, including an "Asian Catastrophic Risk Insurance Facility", should be established to enhance vulnerability and adaptation assessments and promote pubic-private partnerships in adaptation.

17. Despite the fact that the UNFCCC, the Kyoto Protocol, and various COP decisions contain numerous references to sustainable development, participants noted that the current climate regime does not recognise and reward developmental co-benefits. Sustainable Development Policies and Measures (SD-PAMs), which was proposed by the Republic of South Africa, operationalises how these co-benefits could be recognised and rewarded more explicitly than other post-2012 proposals. It could nonetheless be enhanced with systematic criteria to evaluate the contribution to sustainable development of pledged policies and well-defined linkages between climate-related resources and domestic developmental needs.

18. To further strengthen the recognition and rewarding of co-benefits in the future regime: (a) researchers should standardise rapid analytical methods to evaluate the developmental contribution of pledged policies (to be verified by an international sanctioned body with more rigorous analytical tools), (b) policymakers should conduct an assessment on integrated policies that stand to benefit the most from regime-related financial and technical support, and (c) climate negotiators should gradually scale up these institutional reforms in multiple stages, beginning with voluntary pledges, piloting of standardised tools and rewarding of integrated policies.

Recommendations for Strengthening The Climate Regime beyond 2012 from an Asian Perspective

1. The design of the future climate regime should not constrain sustainable development in developing Asia. In view of the region's growing energy demands and GHG emissions, the international community should make earnest efforts to support Asia in its transition towards an energy efficient, low-carbon economy. Aligning Asia's developmental priorities with global climate interests is, therefore, urgently warranted.

2. Climate negotiators should strive to provide credible policy signals for the continuity of market mechanisms while ensuring equity, environmental integrity and cost effectiveness. Efforts to refine and expand carbon markets, and to broaden the involvement of Asian countries in mitigation efforts through the careful design of sectoral approaches and other innovative methods should be accelerated, while paying due attention to institutions and incentives that can ease enforcement at the local level.

3. Future climate regime discussions can facilitate the rapid uptake of low-carbon technologies by creating regulatory frameworks and legislation that is designed to improve finance, build synergies between technology initiatives and enhance the flexibility of the intellectual property rights regime. However, the political feasibility of technology agreements (in terms of self-enforceability, the provision of side-payments, and the alignment with domestic sub-national interests and institutions, among others) must be fully considered.

4. The future climate regime should facilitate the mainstreaming of adaptation concerns in development planning and assistance across Asia by providing practical examples, improving capacities and requiring all development policies to undergo an "adaptation check". Further efforts to mobilise funding for adaptation, for instance, by offering opportunities for the active involvement of the private sector and encouraging public-private partnerships in adaptation efforts, must be pursued while making effective use of climate insurance instruments.

5. The recognition and rewarding of developmental benefits can strengthen the development and implementation of climate actions in Asia. Climate negotiators should consider gradually scaling up Sustainable Development Policies and Measures (SD-PAMs) in multiple stages, beginning with voluntary pledges, piloting of standardised tools, and rewarding of prioritised integrated climate and development policies.

6. A clear and ambitious long-term climate framework, which treats mitigation, adaptation, technology and financing in a more balanced manner than before, should be agreed upon as soon as possible. The framework should have a menu of options and diverse approaches so that all nations can commit to measurable, reportable and verifiable climate actions consistent with national circumstances and UNFCCC principles.

Chapter 1

Introduction

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Introduction

Ancha Srinivasan

The year 2007 witnessed unprecedented momentum on the issue of climate change. The publication of the "Stern Review on the Economics of Climate Change" in late 2006 attracted wide attention in early 2007 by policymakers in both developed and developing countries, as the review concluded that costs of inaction in addressing climate change would be several times higher than the costs of action (Stern 2007). Starting in February 2007, the Intergovernmental Panel on Climate Change (IPCC) released a series of comprehensive reports highlighting that climate change is "unequivocal" and that it was at least 90% certain that human emissions of greenhouse gases (GHG) rather than natural variations are warming the planet's surface. The IPCC provided a significant amount of new information on current and projected impacts of climate change, cost-effective mitigation opportunities and various options to balance mitigation and adaptation within the framework of sustainable development (IPCC 2007). Several high level events hosted by the UN Secretary General and many non-UN forums such as the Asia Pacific Economic Co-operation (APEC) also received considerable attention throughout the year.

The Bali Action Plan, despite its lack of clarity on many aspects, might be considered significant not only because it contained a roadmap, an agenda and a deadline but also due to concurrent progress in discussions on all four building blocks of the climate regime beyond 2012.

The joint award of the Nobel Peace Prize on 10 December 2007 to the IPCC and the former United States Vice-President Al Gore "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change", and the agreement on the "Bali Action Plan" on 15 December 2007 at the 13th Conference of the Parties (COP 13) to the United Nations Framework Convention on Climate Change (UNFCCC) and the 3rd Meeting of the Parties to the Kyoto Protocol (MOP3) held in Bali, Indonesia in December 2007 culminated the year with growing expectations for concrete actions at the international level.

The Bali Action Plan, despite its lack of clarity on many aspects, might be considered significant from negotiators' perspective not only because it contained a roadmap, an agenda and a deadline but also due to concurrent progress in discussions on all four building blocks of the climate regime beyond 2012 – mitigation, adaptation, technology and finance. In terms of mitigation, delegates agreed to consider "measurable, reportable and verifiable nationally appropriate mitigation actions" and to further discuss "global sectoral emissions targets for certain industries". An agreement on management of adaptation fund was reached, and the discussion on reducing emissions from deforestation, and financing mechanisms moved forward. In addition, a strategic programme to scale up investment in the transfer of both the mitigation and adaptation technologies was agreed to be initiated. It is expected that negotiations on the post-2012 agreement would be finalized in Copenhagen, Denmark in late 2009.

Within Asia too, climate change attracted attention from policymakers in 2007. Japan proposed an ambitious global target of reducing global GHG emissions by 50% by 2050, which the leaders of the G8 summit held in Heiligendamm, Gemrnany in June 2007 agreed to consider seriously. In June 2007, China issued the National Climate Change Programme, which pledged to restructure the economy, promote clean technologies and improve energy efficiency. China's State Council released the Integrated Work Plan on Energy Saving and Emissions Reduction, and launched a national campaign under the leadership of Premier Wen Jiabao with the goal of reducing the per unit of Gross Domestic Product (GDP) energy consumption by 20% and total emission of SO_2 by 10% from 2005

to 2010. In India, a special national committee on climate change was formed to provide policy recommendations by 2008. Inter-ministerial bodies to address climate change were established in several countries including Indonesia, the Philippines and Thailand. The APEC forum announced a target to increase energy efficiency by 25% by 2030 for its members. Declarations on the environment, climate change and energy were issued by both the Association of Southeast Asian Nations (ASEAN) and the East Asian Summit.

1.1 Alarming Trends in GHG Emissions, Carbon Intensity and Efficiency of Natural Sinks

As per the latest "Vital Signs" report of the World Watch Institute, global atmospheric GHG emissions are continuing to rise at alarming rates, with atmospheric carbon dioxide (CO_2) concentrations reaching 381.84 parts per million (ppm) in volume in 2006, an increase of more than 100 ppm over pre-industrial levels, largely due to growing fossil fuel use, rising populations, increasing consumption patterns, and land use changes (WI 2007). Global GHG emissions per year rose 70% between 1970 (29 $GtCO_2e$) and 2004 (49 $GtCO_2e$) and would rise another 25-90% above 2000 levels by 2030 without new restraints (IPCC 2007). Since 2000, the growth of carbon emissions from fossil fuels has tripled compared to the 1990s. Energy production-related CO_2 emissions reached 26.6 Gt in 2004, a 28% increase since 1990 (Table 1.1). This increase stems largely from China, where emissions have doubled from 2.3 Gt in 1990 to 4.8 Gt in 2004 (IEA 2007).

Global GHG emissions per year rose 70% between 1970 (29 $GtCO_2e$) and 2004 (49 $GtCO_2e$) and would rise another 25-90% above 2000 levels by 2030 without new restraints (IPCC 2007).

Adding to this disturbing news, Raupach et al. (2007) recently reported that current anthropogenic emissions are tracking above the most intense fossil fuel scenario established by the IPCC SRES (2000), and are moving away from stabilisation scenarios of 450 ppm and 650 ppm. Likewise, IEA projections suggest that global carbon emissions could rise by 57% by 2030 if current trends hold, a projection that would be consistent with a long-term global temperature increase of 5-6°C (IEA 2007). The other worrying signs include a plateau of the carbon intensity of the world's economy after 100 years of decline, and the decline in the efficiency of natural sinks by 10% over the last 50 years, implying that the longer we wait to reduce GHG emissions, the larger the cuts needed to stabilise atmospheric CO_2 (GCP 2007). Thus the recent acceleration of atmospheric CO_2 was attributed to a 65% increase in economic activity, a 17% deterioration in carbon intensity of the global economy, and an 18% decreased efficiency in natural sinks (Canadell et al. 2007).

If the above trends continue, global temperatures could rise further by the end of this century, leading to potentially disastrous impacts. At the same time, the world is confronted with several developmental challenges (e.g. only one out of six persons on the planet has access to energy required to provide the high living standards enjoyed in developed countries), which will require substantial investments with energy demand rising at least two to three times from 2000. Reshaping of our energy future through accelerated changes in energy infrastructure away from fossil fuels, mediated by deployment of appropriate technologies and policy frameworks, is therefore crucial to minimise such impacts.

Reshaping of our energy future through accelerated changes in energy infrastructure away from fossil fuels, mediated by deployment of appropriate technologies and policy frameworks, is crucial to minimise potentially disastrous impacts.

Table 1.1 Energy production-related CO_2 emissions in selected Asian countries and the world

Country	1990	2004	Change (%) 1990-2004	Share in % 2004
China	2289	4769	+108.3	17.9
India	588	1103	+87.5	4.1
Japan	1058	1215	+14.8	4.6
Republic of Korea	226	462	+104.6	1.7
Rest of Asia	686	1395	+103.4	5.3
Asia	4847	8944	+84.5	33.6
World	20783	26583	+27.9	100

Source: IEA 2007

1.2 IGES Consultations in Asia on the Post-2012 Climate Regime

The success of any future climate regime will rest on policies and measures adopted by Asian countries in the areas of both mitigation and adaptation.

Despite growing evidence of the adverse impacts of climate change and the vulnerability of ecosystems and human populations in the Asia-Pacific region, most countries have not taken climate change as a high policy priority due to a preoccupation with other issues such as poverty alleviation, health, education, etc. Furthermore, despite increasingly evident linkages between sustainable development and climate concerns, stakeholders and negotiators from most Asian countries have largely remained on the sidelines of discussions on the international climate regime, perhaps due to a perception that climate change is largely a problem created and to be resolved by industrialised countries.

In view of the growing GHG emissions from the Asia-Pacific region, it is now widely accepted that the success of any future climate regime will rest on policies and measures adopted by Asian countries in the areas of both mitigation and adaptation. For example, a recent report released by the Asian Development Bank (ADB) entitled "Energy Efficiency and Climate Change Considerations for On-Road Transport in Asia" showed that GHG emissions in the Asian transportation sector are likely to treble over the next 25 years (ADB 2006). While many governments have recently begun to take several domestic policies and measures within the context of their national circumstances, further progress can be achieved by a shared understanding of opportunities and challenges.

It is against this background that the Institute for Global Environmental Strategies (IGES) launched a consultation process with key Asian stakeholders in 2005. The two broad goals of this process were to promote constructive thinking in the region on climate change actions beyond 2012, and to contribute to the shaping of a future climate regime that reflects the concerns and developmental aspirations of the region. The consultations were initiated with four specific objectives in mind:

(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 while minimising adverse impacts on socio-economic systems;

(c) To assess the viewpoints of key Asian stakeholders (policymakers, 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 the future climate regime.

1.3 Methodology

Three rounds of stakeholder consultations have been held to date. 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 addressed at the international level. The discussion also focused on country-specific concerns on climate change, national priorities for strengthening the current climate regime, and country-specific preparations, if any, for the post-2012 climate regime. Based on the outcomes of the consultations, IGES published a report (available online at http://enviroscope.iges.or.jp/modules/envirolib/view.php?docid=169), which was disseminated at both the COP11/COPMOP1 held in Montreal, Canada in December 2005 and at the 14th Session of the United Nations Commission on Sustainable Development (CSD-14) held in New York, USA in May 2006.

The second round of consultations was held in 2006 on a sub-regional basis in Northeast Asia (Beijing), Southeast Asia (Bangkok) and South Asia (Delhi). After briefly discussing national perspectives on the climate change regime, specific ways of strengthening the future climate regime were discussed, focusing on four key themes: energy security and developmental needs; the clean development mechanism (CDM); technology development and transfer; and adaptation. In this round, specific concerns of Asian countries that were highlighted in the first round were explored further, and major proposals to strengthen the climate regime to address concerns related to each theme were reviewed. Based on the outcomes of the consultations, IGES published a report (available online at http://enviroscope.iges.or.jp/modules/envirolib/view.php?docid=535), which was disseminated at both the COP12/COPMOP2 held in Nairobi, Kenya in November 2006 and at the CSD-15 held in New York, USA in May, 2007.

The first two rounds of consultations considered the various concerns and interests of developing Asia for the future climate regime. As the design of the future climate regime is largely dependent on reconciling the interests of industrialised and developing countries, the third round of consultations were held in 2007 in India (New Delhi, 29-30 August 2007) and China (Beijing, 13-14 September 2007) by inviting selected representatives from both developed and developing countries. In this round, the participants discussed ways to reconcile Asian developmental priorities and global climate interests by focusing on four specific elements of the future climate regime: institutionalisation of sectoral approaches; political feasibility of technology transfer mechanisms; financing and mainstreaming options for adaptation; and the recognition and rewarding of co-benefits of climate actions. Discussions centred on how developing Asia could contribute to global negotiations and benefit from strengthening the future climate regime in each of these areas, while leading to more proactive actions by both developed and developing countries.

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1.4 Findings from Round I Consultations

In round I, participating stakeholders underscored that insufficient attention to the developmental priorities of Asian countries was a major drawback of the current regime and that the future regime discussions should consider Asian interests more effectively than in the past.

In round I, participating stakeholders recognised various achievements of the current climate regime through the UNFCCC and the Kyoto Protocol. However, they expressed strong concerns over the progress of implementation of various decisions. They also noted that the past negotiations on climate change regime were not transparent and did not adequately consider views of Asian stakeholders. Participants underscored that insufficient attention to the developmental 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 future climate regime, was a major drawback of the current regime.

Representatives from many countries stated that developmental concerns, especially related to energy security, were largely ignored in climate negotiations although climate and energy are closely related. They stated that the future regime discussions should therefore consider Asian interests more effectively than in the past. Participants in countries such as the Republic of Korea expressed concerns with maintaining industrial competitiveness in a carbon-constrained world. Many countries indicated 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-in contrast to 1,760 from the European Union and the United States—contributed to the Third Assessment Report of the IPCC, participants noted the growing need for strengthening both scientific and negotiating capacities in the region. Although the representation from Asia grew slightly in the fourth assessment report, it remains low compared to other regions.

Participants generally agreed that the future climate regime must focus on ways to (a) integrate climate concerns into 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 argued 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 to focus more on adaptation and preferential financing mechanisms.

1.5 Findings from Round II Consultations

Since developmental priorities, CDM, technology and adaptation were repeatedly mentioned in round I consultations and they were largely similar to issues selected by the UNFCCC as part of the "dialogue on long-term cooperative actions", our consultations in round II were designed to explore these themes more closely. In round II, participating stakeholders stressed that the ratification of the Kyoto Protocol was an effective indicator of their country's seriousness to address climate change and that abandonment of the protocol by 2012 would be a global tragedy. However, they noted that the success of

Kyoto Protocol in reducing GHG emissions worldwide or improving the coping capacity of Asian populations and ecosystems was limited. Despite the initiation of informal discussions on the future climate regime at COP11 in Montreal under multiple tracks ("convention" track, "protocol" track, etc.), most countries in the region did not declare a specific position on the post-2012 climate regime by 2006 due to various technical, institutional and administrative barriers. Participants appreciated that the IGES initiative provided 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 United States. Other participants preferred an inclusive (with all Annex I parties) and mandatory climate regime, rather than a cluster of voluntary efforts.

Despite many references to the terms "energy" and "development" 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 were far from satisfactory. They observed, for instance, that the future climate regime should identify and facilitate the most pragmatic measures to mainstream climate concerns in energy and development planning, and support the implementation of integrated development and climate strategies at various levels. Since energy security is an issue on which both developing and developed countries share common interests, it was argued that 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. It was also suggested that the discussions should focus more on social and economic aspects of co-benefits from mitigation policies, with a view toward helping the least developed countries (LDCs) achieve the millennium development goals (MDGs) and providing assistance to newly industrialised countries to increase their economic and environmental efficiency. Operational support from the UNFCCC, 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, was also seen as critical to address the mainstreaming of climate risks in the development agenda.

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Many stakeholders stressed that providing an early, credible signal on the continuity of CDM and ensuring the value of Certified Emission Reductions (CER) after 2012 are vital. Options for an early signal include (a) a unilateral declaration by Annex I countries to extensively utilise post-2012 CER including towards meeting their targets for the first commitment period, (b) an extension of the period of the next commitment to beyond ten years instead of the current five year period, and (c) proactive support for post-2012 CER by multilateral financial institutions. 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 sustainable development benefits from CDM. Stakeholders emphasised the need for employing innovative financing approaches to cover underlying finance needs of CDM projects in the region. Some of the suggested options included: strengthening synergies in the private sector between Annex I and non-Annex I countries through bilateral business agreements; utilising Official Development Assistance (ODA) for CDM implementation especially during the early stages and in countries that are not

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 sustainable development benefits from CDM.

financially attractive to investors from the perspective of project financing, and utilising multi-source funding effectively to spread risk among several institutions.

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 regime.

Participants expressed serious concerns about 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 such as the Asia-Pacific Partnership on Climate and Clean Development (APP), which have the 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. 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 include extensive collaboration in the early stages of technology development leading to joint ownership of IPRs with developed countries, and the 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. Stakeholders noted that ensuring additional finance through innovative public and private support mechanisms is critical to make the currently available technologies commercially competitive.

Participants stressed that the future climate regime should enhance the focus on adaptation to a similar level as that of mitigation because several countries in the region are already facing the impacts of climate change. It was suggested that 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. 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 at both the policy and operational levels. Since the demand for adaptation funds will likely 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 for 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.

The need for enlarging the funding base for adaptation, differentiating between actions that can be funded inside and outside the climate regime, and creating market mechanisms and incentives for the private sector was recognised.

1.6 Round III Consultations

As noted earlier, the aim of the round III consultations was to identify specific opportunities to reconcile Asian developmental priorities and global climate interests. Discussions therefore primarily focused on four elements of the future climate regime that are crucial to arriving at a consensus between developed and developing countries: (a) sectoral approaches, (b) technology transfer, (c) adaptation financing and mainstreaming, and (d) developmental co-benefits.

In view of the interest expressed by stakeholders that project-based market mechanisms be expanded to cover entire sectors, we examined the rationale and principles for implementation of sectoral approaches. Perspectives of both developed and developing countries on how sectoral approaches should be implemented in the context of the

post-2012 climate regime were discussed. Likewise, the political feasibility and incentive structures of selected technology-oriented proposals were examined with a view toward avoiding a carbon intensive technology "lock-in" in developing countries. Both financing and mainstreaming of adaptation were considered crucial in Round II consultations. Discussions in 2007, therefore, focused on principles and mechanisms to enhance adaptation funding and various pragmatic options for mainstreaming adaptation concerns in development planning and assistance. Finally, mechanisms and means to recognise and reward developmental co-benefits of climate actions in the future climate regime were also discussed. The details of the outcomes of these theme-specific discussions are given in chapters 2 to 5.

In addition to the above four specific themes, discussions focused on national perspectives and the roles of China and India in formulating an effective and flexible post-2012 climate change regime. A few salient findings from these discussions are given below to serve as a background for the remaining chapters.

- Participating stakeholders in both China and India confirmed their interest in accelerating their countries' transition towards a low-carbon economy in the long run, but stressed that the future regime design should not constrain sustainable development in developing Asia. A few participants stressed that the focus of the future regime discussions should be on changing energy-intensive lifestyles and consumption patterns, and that the regime design should consider a new set of carbon standards to promote a transition to low-carbon societies in both developed and developing countries. For example, it was noted that 45-55% of total energy use is influenced by consumer activities for personal transportation, personal services and homes. To reduce this percentage, it was suggested that all countries should raise public awareness of low-carbon products, services and lifestyles.

- Participants underscored the need for more ambitious targets for reduction of GHG emissions by developed countries based on the principles of historical responsibility and capability. They also suggested that developed countries should preferentially support mitigation actions that are consistent with economic and social development goals in developing Asia.

- Some Indian participants likened the current regime to a game in which industrialised countries are merely trying to retain competitive advantage in trade and energy sectors while attempting to pass on the economic burden of GHG stabilisation and minimise resource transfers to developing countries. The developing countries, on the other hand, are trying to avoid the commencement of any process leading to uncompensated GHG constraints and to ensure that any apportionment of GHG emission rights is based on equity, while trying to realise their competitive advantage in carbon trading through the CDM.

- A few stakeholders suggested that the future climate regime should focus on mitigation, adaptation, technology and financing in a more balanced manner than before and that the developing Asia would prefer a whole package of measures rather than only mitigation targets. It was also suggested that implications of the various post-2012 climate regime proposals and targets (e.g. 50% GHG reduction by 2050) on future prospects for development of various Asian countries should be examined thoroughly.

Participating stakeholders confirmed their interest in accelerating their countries' transition towards a low-carbon economy in the long run, but stressed that the future regime should not constrain sustainable development in developing Asia.

The future climate regime should focus on mitigation, adaptation, technology and financing in a more balanced manner than before.

The climate change regime should provide credible policy signals to enable long-term low-carbon investments in developing Asia.

- Some participants argued that commitments based on energy intensity are not acceptable for developing countries such as India, as energy intensity depends upon both energy efficiencies of different sectors and sectoral shares of GDP. They noted that extrapolating current energy intensity levels into the future is inappropriate as the relative growth rates of different sectors in the future are uncertain for developing countries. They also stressed that harmonisation of energy efficiency standards with those of industrialised countries is not necessarily advantageous for developing countries, as a movement to technical efficiency does not necessarily involve simultaneous improvement in allocation efficiency, which depends upon the resource endowments in the specific economy.

- Participants emphasised that the climate change regime should provide credible policy signals to enable long-term low-carbon investments in developing Asia, for instance, through avoiding a gap between the first and second commitment periods of the Kyoto Protocol. They stressed that the basic principles (e.g. common but differentiated responsibilities) underpinning the current climate regime should continue to be applied for the future regime. Participants called for a regime that adequately recognises efforts of developing countries to address climate change through domestic policies and measures, including increasing financial investments in energy conservation and renewable energy sectors, promoting several CDM projects, and creating domestic institutions that could be potentially useful for carbon trading and adaptation in the future.

The carbon market should be reformed at the international level through simplified methodologies and making additional sectors eligible for CDM.

- Some participants noted that the CDM is beginning to show fruitful outcomes in some countries and suggested that the carbon market should be reformed at the international level through simplified methodologies (especially for bundled small scale projects, programmatic CDM projects and small-scale forestry) and making additional sectors including nuclear and storage-hydro eligible for CDM. Participants reaffirmed that the future regime should broaden the project-based mechanisms such that a whole sector in one country or across several countries could become eligible for crediting. A few participants stressed that Asian businesses and the private sector should play a much greater role in GHG mitigation. Some participants called for large multi-national firms to undertake binding emission reduction targets across national borders. At the national level, participants stressed the need for development of transparent information system for enterprises and for strengthening the laws governing emission reduction purchase agreements.

- Participants suggested that the future climate regime and associated international policy frameworks must be aligned with the long-term business investment cycle so that investments in advanced low-carbon technologies can be justified commercially. Further efforts to develop and deploy low-carbon technologies based on natural resource endowments of countries in developing Asia (e.g. clean coal technologies, carbon capture and storage, and next generation nuclear technologies) would be crucial, if those countries are to drastically reduce the growth of GHG emissions. It was also argued that climate concerns should be integrated into ongoing upgrades of energy infrastructure throughout developing Asia. Participants reaffirmed that IPR regime for low-carbon technologies should be made flexible along the lines suggested in earlier rounds of IGES consultations. Furthermore, strong financial commitments by multilateral institutions were considered crucial to enable "technology leapfrogging" by developing Asia.

- A few participants stressed the need for channelling more sustained investments into research, development and deployment of low-carbon technologies in both developed and developing countries, as such investments are substantially less than investments in other policy areas (e.g. AIDS prevention and treatment).

- Some participants argued that developing countries would be more interested in climate co-benefits of developmental policies rather than developmental benefits of climate actions. They suggested that the future climate regime should create an enabling environment for creation of development strategies with climate co-benefits and stressed the need for extensive collaboration between developed and developing counties in the development of biomass-based technologies, which have both development and climate benefits.

Strong financial commitments by multilateral institutions were considered crucial to enable "technology leapfrogging" by developing Asia.

1.7 Outline of the Report

This report presents a summary of what has been learnt through the third round of consultations, interviews and questionnaire surveys with policymakers and climate policy researchers across the Asia-Pacific region. Chapter 2 considers how sectoral approaches can be integrated in the future climate regime by looking at institutional and operational issues from an Asian perspective. Chapter 3 examines incentive structures and the political feasibility of selected proposals on technology cooperation, while Chapter 4 focuses on adaptation financing and mainstreaming. Chapter 5 highlights various ways to recognise and reward developmental co-benefits in the future climate regime.

The future climate regime should create an enabling environment for creation of development strategies with climate co-benefits.

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Chapter 2

Sectoral Approaches: Prospects and Challenges in Asia

Chapter 2

Sectoral Approaches: Prospects and Challenges in Asia

Hitomi Kimura and Ancha Srinivasan

2.1 Introduction

Sectoral approaches are receiving considerable international attention as an alternative way to economy-wide emission reductions and to broaden participation of countries in the future climate regime.

Sectoral approaches are receiving considerable international attention as a new and alternative way to economy-wide reductions in greenhouse gas (GHG) emissions, which have been the main focus of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. They are also seen as a way to broaden participation in the future climate regime, expand the coverage of flexibility mechanisms of the Kyoto Protocol from a project basis to a sector level, and address concerns of competitiveness, especially in energy and emission-intensive, trade-exposed industries. Thus sectoral approaches, including sectoral Clean Development Mechanism (CDM) and Sustainable Development Policies and Measures (SD-PAMs) (Winkler et al. 2002, Government of South Africa 2006), are now recognised as a potentially effective GHG mitigation strategy (UNFCCC 2007a).

Discussions on sectoral approaches at the international level were initiated at the 10th Conference of the Parties (COP10) in 2004 (Buenos Aires, Argentina), and were included in the Chair's report of the Ad Hoc Working Group (AWG) on Further Commitments for Annex I Parties under the Kyoto Protocol in 2006. The recent decision on the "Bali Action Plan" adopted at COP13 in December 2007 also notes that the newly established AWG on long term cooperative action under the UNFCCC address, among others, "cooperative sectoral approaches and sector-specific activities." Sectoral approaches received much attention in non-UNFCCC forums as well. The G8 summit held in Heiligendamm in June 2007, and the "Major Emitters" meeting held in Hawaii in January 2008 recognised the potential of sectoral approaches for GHG mitigation. The voluntary agreement on technology transfer through eight task forces of the Asia-Pacific Partnership on Clean Development and Climate (APP), the voluntary agreement of the European Commission with car manufacturing associations with targets on CO_2 emissions per kilometer for new cars, the set-up of regional/national intensity targets among major steel manufacturers (International Iron and Steel Institute [IISI] 2007), and the sectoral target setting on energy conservation by 2009 by ASEAN+6 are some of the non-UNFCCC initiatives along the lines of sectoral approaches.

While the idea of mitigating GHG emissions on a sectoral basis is not new, the proposal that attracted considerable attention in our consultations was presented by the Center for Clean Air Policy (CCAP), based on a three and a half year dialogue with senior climate negotiators from 15 developed (Annex I) and 15 developing (non-Annex I) countries, and selected company representatives (CCAP 2006). The CCAP proposal involves six-steps: – agreement on participation of specific countries; definition of benchmarks for energy efficiency in a given sector; negotiations on GHG intensity target levels for new and existing facilities in each sector; linking the programme to the technology finance package; linking to the Annex I target setting process; and agreement on the structure of trading including links to CDM. Implementation of each step will require considerable negotiation, political will and reconciliation. It is expected that implementation of

such approaches can promote the use of best practices in internationally competitive industries.

Baron (2007) grouped sectoral approaches into four types: a) a global action, i.e. a unilateral move by industry to foster GHG improvement worldwide (e.g. World Business Council on Sustainable Development (WBCSD)'s Cement Sustainability Initiative (CSI), the voluntary targets of the members of the International Aluminium Institute, the CO_2 breakthrough project of IISI); b) a global agreement between industry and Parties to the UNFCCC; c) a series of national policies targeting a sector, with some intergovernmental coordination (similar to SD-PAMs); and d) a sectoral crediting mechanism whereby reductions recorded at the sector level are eligible for emission credits.

Another grouping includes quantitative emissions reduction targets and sectoral crediting mechanisms. Quantitative emissions reduction targets may include national targets (e.g. Triptych, multi-sector convergence), national sectoral targets (e.g. fixed, dynamic or intensity targets[1]), and trans-national sectoral targets (e.g. uniform base-level intensity, identical or non-identical percentage cuts over current emission levels) (e.g. Siikavirta 2006, Baron et al. 2007, Bodansky 2007). National sectoral targets may be commitments for emissions reductions in selected sectors at the national level (White House Council on Environmental Quality 2007, ASEAN+6 2007), while trans-national sectoral targets are internationally negotiated emissions reduction targets that are applied to specific sectors on a global basis (e.g. Ecofys and GtripleC 2007, Regeringskansliet 2007).

Sectoral crediting mechanisms are mainly applicable for non-Annex I countries and may be envisaged as (a) expansion of current CDM from a project level to programme (programmatic CDM) or sector (sectoral CDM – Saminiego and Figueres 2002, Cosbey et al. 2005, Baron and Ellis 2006, Sterk and Wittneben 2005) or policy based CDM (Ofosu-Ahenkorah 2005); (b) creation of a new mechanism to credit emission reductions beyond no-lose sectoral targets (CCAP 2006), countrywide policies and measures (Michaelowa et al. 2003) or policy-based commitments (Lewis and Diringer 2007), and (c) indexed crediting, where GHG emissions below a certain intensity level would generate emission credits (Bosi and Ellis 2005). The sectoral crediting approach would mean that all facilities in a given sector would be included in the system, as against only a limited number of facilities in the current CDM.

For simplicity, the proposals on sectoral approaches are divided here into three groups (Table 1). The first group consists of sectoral approaches that would complement the Kyoto Protocol and require developed countries to take on absolute emission targets. The second group consists of approaches that do not require developed countries to take on absolute emission targets and may be seen as a substitute for the Kyoto Protocol. The third group focuses exclusively on the forestry sector.

Proposals are divided into three groups: 1) approaches that would complement the Kyoto Protocol and require developed countries to take binding absolute emission target; 2) sectoral approaches as a complement to the Kyoto Protocol; 3) sectoral approaches focusing on the forestry sector.

1. Dynamic targets are targets linked to GDP growth intensity targets are targets linked to a sector's operations (e.g. emissions per unit of output, like kWh or tonne of steel)

Table 2.1 Main features and incentive mechanisms of selected proposals on sectoral approaches

Proposal/ initiative	Main features	Incentive mechanisms
I. Proposals that require absolute GHG emission reduction targets from developed countries		
Sectoral No-lose target (CCAP 2006)	• Key developing countries pledge to achieve voluntary no-lose GHG intensity targets in major industrial sectors (e.g. electricity, cement, iron & steel, aluminium, oil refining, cement, lime, pulp/paper, etc) based on negotiation with developed countries and a bottom up expert assessment of energy intensity benchmarks. Other sectors (e.g. transportation, residential & commercial) are eligible for project- or sector-based CDM. • Emissions reductions achieved beyond the voluntary pledge would be eligible for sale as Emission Reduction Credits (ERCs) to Annex I countries. Failure to meet the voluntary pledges would not involve penalties or requirement to purchase ERCs from other countries. • The targets for developed countries would be hard, aggregate, economy-wide targets built upon the sectoral approach.	• **Finance & Technology:** Developed nations and international financial institutions provide developing countries with Technology Finance and Assistance Package to support commitments for the deployment of advanced technologies, development of small and medium-sized enterprises to assist in technology implementation, capacity building and support for pilot and demonstration projects. • **Crediting:** ERCs are fully fungible with the Kyoto credits. Current CDM and sectoral approaches co-exist, but sectoral approach is preferred to CDM. Developing countries not participating in the no-lose sectoral approach could still carry out CDM projects, utilising energy intensity target as CDM baseline.
Sao Paulo Proposal (BASIC 2006)	• Annex I Parties negotiate absolute annual emission limits between 2013 and 2018. Each Party expresses its commitment as a combination of the following: an absolute emissions limit (tCO_2e/year); emissions intensity limit (tCO_2e/unit GDP); new and additional funding (USD/year) to a maximum of 10% of its commitment (based on international carbon price). After 2018, commitments are automatically extended yearly. • Non-Annex I Parties choose from CDM, SD-PAMs, sectoral approach (excluding Land-Use, Land-Use Change and Forestry [LULUCF]), and national no-lose target. National no-lose target is decided after review by CDM Executive Board (CDM-EB) and more than three-fourths majority approval by COP/MOP. Credits earned from meeting no-lose targets in developing countries can be sold in the market up to some extent. Developing countries are expected to adopt more stringent commitments, once their limit of Certified Emission Reductions (CER)/ Voluntary Emission Reduction(VERs) exceeds 20 billion tCO_2e after 16-40 years.	• **Finance & Technology:** Technology funding mechanism is supported by 2% share of proceeds from Joint Implementation (JI) and international emissions trading scheme. • **Crediting:** Developing countries receive VERs (Voluntary Emission Reduction) equivalent/ fungible with CER based upon the target. For crediting, CDM is preferred to sectoral approach.
Sectoral Crediting Mechanism (Bosi and Ellis 2005)	• Three types of sectoral crediting mechanisms: 1) policy-based crediting (emissions reduction in specific sectors); 2) rate-based/indexed crediting (intensity improvement by sector or companies), and 3) fixed sectoral emission limits. The proposals are divided into trans-national (e.g. multi-national corporations) or national (e.g. transport) sectoral mechanism, and binding or voluntary. • **Participants:** 1) policy-based: governments 2) rate-based/indexed: governments alone or with representatives of industrial groups; 3) fixed emission limits: governments alone or governments and industry.	• **Finance & Technology:** Companies cover the necessary cost of finance and technology. • **Crediting:** Within a sector, CDM projects are preferred to sectoral approach for crediting.
Sectoral Approach (Baron and Ellis 2006)	• Four types of sectoral crediting mechanisms: 1) global action (pledge and review by the industry without government's role); 2) global agreement between industries and Parties; 3) agreement between sectors and governments; 4) sectoral crediting mechanism in non-Annex I countries. Sectors agree on specific benchmarks, technologies, energy efficiency targets or GHG intensity targets.	• **Crediting:** Applies only to sectoral crediting mechanism in non-Annex 1 countries. Discounting may be applied in case of oversupply of credits.
II. Proposals that do not necessarily require emission reduction targets from developed countries		
Sectoral Proposal Templates (Ecofys and GtripleC 2007, Höhne 2006)	• Developing countries pledge no-lose GHG voluntary intensity targets (alternative to national binding absolute targets) for certain sectors (e.g. cement, iron and steel, pulp and paper, refineries, electricity, transport), and UNFCCC issues credits if the intensity is below the pledged target based upon the agreement by the COP/MOP or the appropriate body. • To assist developing country pledges, templates were prepared for steel, cement and transport sectors.	• **Crediting:** Issued credits can be sold in the international market.
Policy-based commitment (Lewis and Diringer 2007)	• Countries undertake national policies to reduce emissions but they are not bound by economy-wide targets. Commitments may be voluntary or binding. • Policies vary widely in scope and form, from economy-wide energy efficiency goals to sector-specific standards and reforms. • Governments are required to report periodically on the implementation of their policies, subject to some form of review or enforcement.	• **Finance & Technology:** Policy commitments provide a basis for support through crediting, private investment, or direct assistance. Financial incentives (e.g. up-front grants) or new mechanisms (e.g. long term concessionary loans, tax incentives) could be offered for adoption and implementation of policy commitments to deploy low-carbon technologies. • **Crediting:** Policy-based crediting serves as an incentive.

Table 2.1 (continued)

Proposal/ initiative	Main features	Incentive mechanisms
II. Proposals that do not necessarily require emission reduction commitments for developed countries (continued)		
Sectoral approach (IISD 2005)	• Approaches include: 1) sectoral policy-based crediting (credits for adopting and implementing climate friendly policies in a sector); 2) country-specific dynamic sectoral crediting baseline (focus on key sectors e.g. electricity, transport); 3) trans-national sectoral targets (for energy-intensive industries subject to international competition e.g. aluminium, aviation, maritime).	• **Finance & Technology:** Country-specific crediting scheme addresses financing and transfer of technology. • **Crediting:** Sectoral policy includes crediting mechanism. CDM is preferred to sectoral approach.
International Agreements on Energy Efficiency (Ninomiya 2003)	• Selected countries negotiate an international agreement on energy efficiency addressing the production process in major emitting industries (iron and steel, petrochemicals, paper and pulp, non-ferrous metals, and non metallic minerals) under UNFCCC or separately, and develop energy efficiency standards for major appliances in the residential and transportation sectors.	• **Finance & Technology:** Establishment of a global research and development fund.
Multilateral agreements (Bodansky 2007)	• Multilateral agreements in which governments commit to emissions reduction from a given sector.	• **Finance & Technology:** Critical technology and finance issues within a sector can be addressed when they are considered most urgent.
Nationally defined sector-based approaches (White House Council on Environmental Quality 2007)	• Nationally defined sector-based approaches in sectors such as power generation (e.g. clean coal, nuclear, renewable energy), transportation, land use, energy efficiency and adaptation to be agreed upon by the end of 2008 among major economies including developing countries (e.g. Brazil, China, India, Republic of Korea, Mexico, Indonesia, South Africa).	• **Finance & Technology:** Provided
METI 2004	• Developed and developing countries set trans-national sectoral intensity target such as energy efficiency target and achieve the target through deployment and transfer of existing technology. Some precedent cases include semiconductor and aluminium industries.	• **Technology:** Technology deployment and transfer is a tool to achieve the intensity target.
Sectoral approach (Keidanren 2007)	• Expansion of the Asia Pacific Partnership (APP) to replace the Kyoto Protocol.	• **Technology:** Technology cooperation is the basis of agreements.
Global sectoral approach for steel (IISI 2007)	• Replaces cap-and-trade schemes with national/regional sector-specific voluntary targets (CO_2 emissions reduction per ton of crude steel) that involve all the major steel producing countries after 2012. • IISI covers 180 steel producers and produces 75% of the world's steel (outside China).	• No special incentives are announced but it is likely to involve technology cooperation in some form.
Asia-Pacific Partnership on Clean Development and Climate (APP)	• Partnership among USA, Australia, Japan, Republic of Korea, China, India and Canada (covering around 60% of the world energy consumption and CO_2 emissions); Established eight sector-specific task forces in cooperation with individual companies; Partnership complementary to the Kyoto Protocol, based on benchmarking and energy efficiency. For example, the task force on steel sector identified key energy efficiency technologies and estimated CO_2 emission reduction potential as 127 Mt/CO_2 (METI 2007). • Partnership in implementation. Technical and financial cooperation is in progress between the task forces and five international financial institutions (Global Environment Facility [GEF], World Bank, International Finance Corporation [IFC], Asian Development Bank [ADB], Japan Bank for International Cooperation [JBIC]) and International Energy Agency (IEA) (for benchmarking).	• **Finance & Technology:** Task forces in eight sectors promote technology cooperation. IPRs are treated on a case-by-case basis. Funding pledges for technology transfer include USD 51 million from US and 127 million from Australia.
III. Proposals focusing on the forestry sector		
Dual markets approach (CCAP 2007)	• Creation of a separate market for reducing emissions from deforestation and degradation (REDD), in which Annex 1 countries may invest in developing countries in order to achieve the portion of their post-2012 emission reduction target, which is decided by COP. By 2020, COP would determine if the REDD market is stable and mature enough to link with post-2012 carbon market based on the Kyoto Protocol.	• **Finance:** Developed countries commit to financing the creation of emission inventories and baselines in developing countries as a way to reduce the deforestation rate. In addition, investments to achieve partial targets will continue.
Nested Approach (Pedroni 2007)	• An integrated approach to grant tradable emission credits to participate in REDD activities, operating at national and project levels. REDD credits shall be issued for any voluntary emission reduction below the agreed national reference emission level. Such credits would be *permanent and fungible* with any other emission allowances. • A *mandatory reserve account* of XX% of the REDD credits issued from a country would guarantee the permanence of the emission reductions traded in the carbon market.	• **Finance:** A fund to create enabling conditions and pilot experiences in non-Annex I countries complementing the market based mechanisms. • **Crediting:** REDD credits are permanent and are fungible with other allowances/ credits.
REDD (Coalition for Rainforest Nations 2007)	• Establishment of a process for individual countries to voluntarily put forward policies to reduce deforestation and qualify for financial incentives under the climate framework.	• **Finance:** Basket of instruments for finance and capacity building. • **Crediting:** Credits for early action to be fully fungible.
Deforestation & financial incentives (Brazil 2007)	• Voluntary domestic actions to reduce emissions from deforestation linked to financial incentives or credits under UNFCCC, but does not envisage any mechanism that could be used by Annex I countries to meet the target.	• **Finance:** New and additional finance (contribution from multilateral financial institutions and Annex I countries) for technology transfer and capacity building.
Forest Retention Incentive Scheme (Tuvalu 2007)	• Support to projects implemented by local communities that wish to set aside forest areas or manage them on a sustainable basis.	• Financial support from the UNFCCC

2.2 Basic Principles and Defining Characteristics

In order to assess how Asian countries may benefit from sectoral approaches and how the future climate regime discussions can facilitate such approaches, basic principles and characteristics of sectoral approaches are considered briefly in this section.

The stringency and legal character of the sector-based target are especially important for ensuring environmental integrity of sectoral approaches.

Bodansky (2007) and the International Energy Agency (IEA) (2005) identified several key variables to be considered for effective implementation of sectoral approaches. These include: participation of countries or sectors; methods to steer private sector behaviour (e.g. targets, harmonised policies, uniform standards, menu approach); degree of international cooperation; cost of implementation; substantive content (e.g. long-term target [e.g. 50% GHG reduction in steel industry by 2040], emission targets and trading, performance standards [e.g. emissions reduction by a certain percentage per year, fuel economy standards for automobiles], taxes, technology/specification standards [e.g. renewable portfolio standards in an electricity agreement], technology research, development and diffusion); crediting or no crediting and avoidance of double counting, and stringency of the target (e.g. binding or non-binding target/baselines, best-available technology, cost-effectiveness, cost-benefit, balancing, parity). The stringency and legal character of the sectoral target are especially important for ensuring environmental integrity (Regeringskansliet 2007).

A preliminary assessment of proposals suggested that there are at least five important design features in sectoral approaches.

2.2.1 Legally binding or voluntary

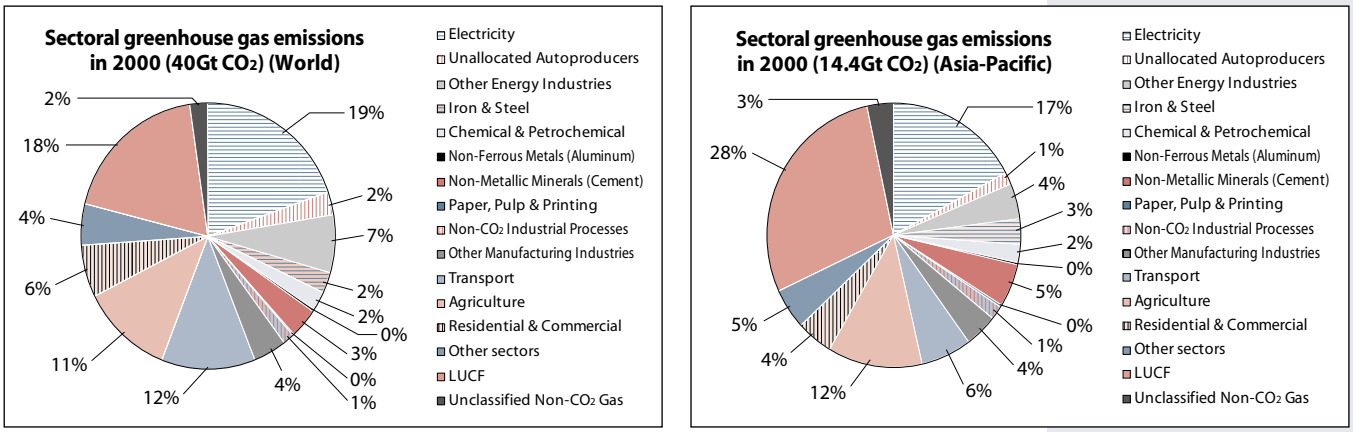
Sectoral approaches can be binding or voluntary (Philibert and Pershing 2001, Watson et al. 2005). As it is unlikely that developing countries would take on binding sectoral targets at this stage (Lewis and Diringer 2007), it may be useful to consider how developing countries responded to proposals on voluntary non-binding committments in recent negotiations. For instance, at COP/MOP2, the Russian Federation proposed that the UN provide technological and financial incentives to encourage non-Annex I countries to take voluntary commitments or targets to reduce emissions under the UNFCCC (Russian Federation 2007). Discussions on this proposal were continued in 2007. While many Annex 1 countries expressed their support for the Russian proposal many developing countries (including China) opposed the idea. Yet other countries such as South Africa offered support but qualified it with reservations on the details of voluntary commitments. A similar response was evident at COP4 when Argentina floated a voluntary commitment proposal that was eventually taken off the table as developing countries complained of a lack of clear procedures for adopting non-binding commitments (Bouille and Osvaldo 2002). Therefore, even for voluntary sectoral proposals, clear rules will be a necessary element.

2.2.2 Target countries/sectors

As industrial sectors in only a few non-Annex I countries account for large proportion of developing country emissions, sectoral approaches could be limited to those countries. For example, the inclusion of the top ten largest GHG emitting developing countries in sectors such as power, iron and steel, chemicals, aluminium, cement and limestone, paper,

pulp and printing would insure coverage of 80-90% of developing country emissions in those sectors (CCAP 2006). Covered sectors, however, will tend to vary widely across countries, reflecting the fact that some countries have larger concentrations of internationally competitive sectors (e.g. steel), energy intensive sectors (e.g. cement, aluminium, marine, aviation), domestically targeted sectors (e.g. electricity) and sectors not covered by the Kyoto Protocol (e.g. deforestation avoidance). Of the above sectors, the potential emissions saving is typically the greatest in the industrial sector (estimated to be 3.3 $GtCO_2$) and, among industrial sectors, the most marked improvements are likely to come from cement, chemicals/petrochemicals, iron and steel (IEA 2007a). In the Asia-Pacific region, industrial sectors such as power generation, cement, iron and steel, and land use sectors such as forestry and agriculture, hold promise to adopt sectoral approaches (Figure 2.1). Beyond which countries and sectors would be covered, leakages between sectors (Watson et al. 2005), eligibility and system boundaries (Ellis and Baron 2005) are additional factors that need to be considered when designing sectoral approaches.

Figure 2.1 Share of global GHG emissions by major sectors in 2000 in the world and the Asia-Pacific region



Source: CCAP 2006

2.2.3 Baselines

Baselines, the projected level of emissions under a business-as-usual scenario, will determine the amount of credits awarded. How baselines are developed is therefore important to the design of a sectoral approach. Some argue that the establishment of sectoral baselines using particular technologies could prove less cumbersome than baseline setting for project-based CDM (Watson et al. 2005), while others take the opposite view, pointing out that it is difficult to gather the needed data and run the necessary projections across what may be multiple projects and regions falling under a single sector (Baron and Ellis 2006). In some cases, the baseline used for sectoral approaches can also be utilised as a baseline of a project-based CDM (CCAP 2006, Baron and Ellis 2006). However, in the case of a no-lose target—a non-binding target that reward countries that went below the target but does not penalise countries for going above the target—the sectoral crediting baseline should be set at a conservative level so that developing countries will have a greater incentive to make reductions and earn emission reduction credits (Ecofys and GtripleC 2007).

Some argue that the establishment of sectoral baselines using particular technologies could prove less cumbersome than baseline setting for project-based CDM, while others point out that it is difficult to gather the needed data and run the necessary projections across what may be multiple projects and regions falling under a single sector.

2.2.4 Relation with CDM

If sectoral crediting baselines are included in the future climate regime, an important consideration is whether the CDM should be continued in those sectors where such baselines are developed (IISD 2005). If a no-lose sectoral target for the cement sector is agreed upon internationally, for example, only those CDM projects in the cement sector that were already registered prior to acceptance of sectoral targets would be continued. Otherwise, to avoid double counting of emission reductions, existing CDM projects would have to be included in the sectoral crediting baseline. On the other hand, it is possible to envision a scenario where CDM can co-exist with sectoral approaches (Ecofys and GtripleC 2007). If this was the case, proposals would be divided into two types, depending on whether the sectoral approaches were instituted prior to or after the registration of a CDM project.

2.2.5 Incentive mechanisms

In case of crediting sectoral approaches, the kind of credits issued, fungibility of sectoral credits with the Kyoto credits and discounting to avoid inflation of credits should be duly considered.

Incentives for developing countries such as a crediting mechanism, technology transfer and financing are also key components of a sectoral approach. In the case of crediting, the kind of credits issued, fungibility of sectoral credits with the Kyoto credits and discounting to avoid inflation of credits merit consideration. Some sector-based proposals suggest issuing CER, while some others suggest issuing different form of credits that are not fungible with CER. The first group of proposals that require developed countries to take on absolute targets (Table 2.1) include a crediting mechanism, while voluntary sectoral approaches rely mainly on the transfer of finance and technology as the primary incentive for developing countries. Forestry-related sectoral proposals focus on capacity building and financial assistance.

2.3 Merits and Demerits of Sectoral Approaches in Asian Context

Sectoral approaches offer a potentially good opportunity to reconcile national developmental priorities in Asian countries and global climate interests. Implementation of such approaches may provide several advantages to developing Asia, some of which are discussed below.

2.3.1 Alignment with sustainable development goals

Sectoral approaches are usually consistent with sector-based development plans and national resource endowments in developing countries, hence they can maximise developmental co-benefits (Watson et al. 2005). They can also improve the data accumulation capacity of different sectors (Sterk and Wittneben 2005) and promote information sharing on good practices between countries. In some countries, necessary data for sectoral approaches are already available, which enable the development of a sectoral emissions monitoring and reporting system (IISD 2005). A sectoral approach can also enable developing Asia to focus on specific sectors where inward investment is needed and which serve the dual purpose of sustainable development and GHG emission reductions.

2.3.2 Ease of administration and simplification of negotiations

Focusing on a few selected sectors with high emissions growth will enable Asian governments and businesses to take strong mitigation policies and measures compared to economy-wide approaches (Watson et al. 2005, IISD 2005, CCAP 2006). Likewise, negotiations among the Parties can be simplified if discussions are focused on a few sectors in a few countries.

2.3.3 Wider coverage of sectors

The Kyoto Protocol does not currently cover sectors such as bunker fuels (aviation, maritime), deforestation avoidance and soil management, which are of increasing importance in Asia. Likewise, sectors such as transportation are unable to benefit from current CDM due to several barriers. Adoption of sectoral approaches in the future climate regime enables the inclusion of such sectors (IISD 2005, IEA 2007a).

2.3.4 Reduction of transaction costs

Transaction costs of GHG reduction would be much less with sectoral approaches as compared to project-based approaches (Saminiego and Figueres 2002) or economy-wide approaches (Bosi and Ellis 2005), thereby making the whole process of GHG mitigation economically more efficient. High transaction cost in the current CDM were often cited as the main reason for limited participation of some Asian countries. The reduced transaction costs through sectoral approaches may enable their more effective participation and improved geographic equity in the future climate regime.

Developing countries can benefit from sectoral approaches in terms of aligning their GHG mitigation plans with sustainable development goals, wider coverage of sectors, reduction of transaction costs, and accelerated deployment of low-carbon technologies.

2.3.5 Recognition and rewarding of developing country efforts

Developing countries in Asia implemented several voluntary domestic emission reduction measures in specific sectors (e.g. cement, power, transportation, forestry), but they are not yet recognised at the international level (Chandler et al. 2002). Adoption of sectoral approaches in the future climate regime can create a mechanism for explicit recognition and rewarding of such efforts (CCAP 2006), which in turn may encourage other developing countries to take similar efforts in priority sectors.

2.3.6 Acceleration of deployment of low carbon technologies

Sectoral approaches can make it easier to deploy low carbon technologies in specific sectors in developing countries through mobilising new public resources and scaling up private investment (Watson et al. 2005). For example, the "technology finance and assistance package" proposed through CCAP's sectoral approach can promote technological innovation (CCAP 2006). Recognising that the project-based approach alone cannot bring in enough investment to achieve technological innovation and sharp emission reductions, the World Bank recently decided to set up a Carbon Partnership Facility (CPF) to scale up the current project-based CDM to sectors covering several cities or regions and create a new demand for credits from the voluntary carbon market as well as post-2012 CER. The CPF is expected to be used in areas such as power sector development, energy efficiency, gas flaring, transport, and urban development, including integrated waste management systems.

2.3.7 Advantages from the perspective of developed countries

For developed countries, sectoral approaches offer advantages such as reflecting their interests, addressing concerns over competitiveness and fairness, and broadening the involvement of countries in mitigation efforts.

For developed countries too, sectoral approaches offer many advantages, including reflecting their national interests, addressing concerns over competitiveness and fairness, and broadening the involvement of countries in mitigation efforts. It is now widely agreed that emission reduction by developed countries alone will not be adequate to stabilise atmospheric GHG concentrations. Indeed recent IPCC reports suggested that emissions should peak within the next decade, with significant reductions (<50% of 1990 levels) by the middle of this century (IPCC 2007). Employment of sectoral approaches worldwide, on the other hand, may lead to huge emission reductions. As the coverage of emission caps under the Kyoto Protocol is unlikely to be extended beyond current participants in the near future, sectoral approaches provide another means of involving countries that do not have emissions targets such as the United States and China to reduce emissions (Watson et al. 2005). The assumption here is that sectoral approaches might enable the transfer of best practices in countries where industrial planners have not considered large-scale mitigation efforts or where policy signals do not exist to encourage the uptake of such a comprehensive approach. Currently industrial sectors in developed countries with economy-wide targets fear that they might lose competitiveness in some sectors as against countries without such targets. Adoption of sectoral approaches may remove such concerns as it would allow governments to shield particular sectors, thereby granting them advantages over their competitors in other countries that do not follow suit (Cosbey et al. 2005, Bodansky 2007).

2.3.8 Limitations of sectoral approaches

Implementation of sectoral approaches poses several institutional and technical hurdles, however, especially if crediting is necessary. Since there is no universally acceptable definition of a sector, defining the boundaries of a sectoral crediting mechanism is one of the most challenging tasks. For instance, the wide variations in GHG intensities among facilities within a sector may require setting up multiple baselines, which in turn may prove burdensome to negotiate at the international level. Further, many developing countries in Asia do not have the institutional capacity or data to set up multiple baselines. Indeed, recent experiences from the IEA, the APP and the CSI suggest the lack of sound data at the level of individual sectors on an international basis (Baron et al. 2007). Even within the same sector, interests are often different between the big and small industries (Ellis and Baron 2005).

Negotiating country-specific baselines for internationally traded commodities and awarding credits without penalising underperformance may run against international trade rules and it may be difficult to reach international consensus (Baron and Ellis 2006). Further, adoption of sectoral approaches alone does not necessarily lead to a reduction of total emissions in growing economies (CCAP 2006). Therefore, Bodansky (2007) reported that sectoral approaches may be the second-best option for global climate regime, and that the post-2012 climate regime should have absolute emission reduction targets for developed countries.

In terms of international competitiveness, sectoral approaches may create winners and losers depending on which sectors are covered, and may lead to undesirable competitiveness impacts between countries in whose economies the covered sectors

feature more or less strongly (Cosbey et al. 2005). There are also concerns such as free riders (Bosi and Ellis 2005, Watson et al. 2005), leakage for non-participants (Colonbier and Neuhoff 2007) and antitrust law issues (Baron et al. 2007). Another major concern associated with sectoral approaches is related to oversupply of credits (Lewis and Diringer 2007). Baron and Ellis (2006) estimated that the power sector of developing countries alone could generate two billion credits per year in 2030, provided all GHG reduction policies involved are deemed additional by the authority governing the sectoral crediting mechanism, as compared with less than 40 million credits per year through CDM (Ellis and Levina 2005).

Other concerns include that many small developing countries may be bypassed in this process and may not benefit from sectoral approaches, as the focus might be mainly on industrial sectors in large developing countries. There is also a concern that sectoral approaches will increase the complexity of international negotiations, as sectoral details with the exception of LULUCF are rarely discussed under UNFCCC and the Kyoto Protocol. Sectoral approaches, if not implemented carefully, may also lead to higher costs of abatement (Baron et al. 2007).

Many small developing countries may be bypassed and may not benefit from sectoral approaches, as the focus might be mainly on industrial sectors in large developing countries.

2.4 Perspectives on Sectoral Approaches

2.4.1 Developing Asia

Participants in IGES stakeholder consultations showed a keen interest in sectoral approaches. However, discussions with individual stakeholders revealed wide variation in understanding of such approaches and preferences for sectors to be included. Perhaps such variation in understanding may become a major barrier in achieving consensus at the international level. This is ironic because one of the listed advantages of sectoral approaches was its ability to align diverse interests and needs of different countries. Representatives from Asian developing countries stressed that flexibility and diversity are required in choosing the sectors, and that sectoral approaches should complement economy-wide emission reduction efforts in developed countries.

In our earlier consultations, many participants from China and India stressed the need for widening the scope of CDM from a project-based approach to sectoral or policy-based CDM, even though their understanding of institutional and operational issues of sector-CDM varied widely. Participants from India, for instance, pointed out that expanding the scope of CDM on a sectoral basis would enable Annex I Parties to adopt deeper emission reductions at the same cost; allow equitable burden-sharing among Annex I Parties; and enable more effective participation by developing countries. Participants from China stressed that sectoral approach to CDM can reduce transaction costs and simplify the current complex procedure of project-based CDM, and that it could benefit the Asia-Pacific region, especially in sectors that are not yet covered by the Kyoto Protocol (e.g. deforestation avoidance, bunker fuels and household sectors) (Kimura et al. 2006). Some participants suggested that different sectors might need different approaches and that emission–intensive sectors, such as iron and steel, cement, electric power or sectors with homogeneous products, should be the first choice. Participants from the Republic of Korea emphasised that sectoral approaches should be designed carefully to address industrial competitiveness in internationally energy intensive sectors. However, participants from Least Developed Countries (LDCs) and Small Island Developing States

(SIDS) expressed concerns about sacrificing the environmental integrity of the Protocol through the expansion of CDM to include whole sectors. Countries with large forest cover such as Indonesia insisted on making deforestation avoidance and a wider use of LULUCF eligible for a sectoral approach (Kimura et al. 2006).

Sectoral approaches, in whatever form, should not compromise the principles enshrined in the UNFCCC and that environmental integrity should be the main consideration.

A few participants from China expressed strong concern that the lack of clarity on operational issues including potential crediting mechanisms, and technical difficulties (data availability, verification, etc.) would be major stumbling blocks to adopt sectoral approaches. They mentioned that sectoral approaches, in whatever form, should not compromise the principles enshrined in the UNFCCC and that environmental integrity, not economic reasons, should be the main consideration. They also noted that adoption of sectoral approaches would not necessarily assure the participation of large developing countries in the future climate regime as several concerns of developing countries are not addressed automatically. They suggested that crediting for sectoral approaches might be an economic incentive for small developing countries but not necessarily for large developing countries. Therefore, they suggested that careful design, including the involvement of competent international as well as local technical organisations, would be crucial to implement sectoral approaches.

2.4.2 Japan and other developed countries

Major developed countries including Japan, EU, and US, and research institutions are all positive about sectoral approaches, although their preferences for design and sectors vary widely.

The Japanese government is strongly in favour of adopting sectoral approaches in the future climate regime. At the World Economic Forum in January 2008, Prime Minister Fukuda proposed that bottom-up sectoral approaches based on energy efficiency indicators should be used in setting quantified national emission reduction targets in the future climate regime (MOFA 2008). The Ministry of Economy, Trade and Industry (METI) also proposed trans-national sectoral energy efficiency standards for both developed and developing countries (METI 2004). Interviews with industrial stakeholders revealed, however, that there were wide differences in views on the implementation of sectoral approaches in the future climate regime. Some representatives of Keidanren, the biggest industrial group comprising many energy-intensive industries, supported sectoral approaches as an alternative to Kyoto-style absolute emission reduction caps for developed countries. They suggested that Keidanren would support efforts of IEA to set up energy efficiency indicators and of APP to extend technology cooperation to additional sectors. Keidanren emphasised that through sectoral approaches developed countries should pledge development of innovative technologies, provide technology assistance to developing countries, and improve energy efficiency of products, and that developing countries should implement projects based on technological assistance from developed countries and pledge energy efficiency improvement in their domestic industries (Keidanren 2007). On the other hand, representatives of the second industrial group in Japan comprising small and medium scale industries, Keizai-Doyu-Kai, insisted on complementing sectoral approaches with the Kyoto-style targets. They preferred absolute targets for developed countries, energy intensity targets for newly industrialised countries, and voluntary targets for other developing countries (Keizai-Doyu-Kai 2007).

The European Union (EU) reported that sectoral approaches might be acceptable to many Parties and that the post-2012 agreement should include flexible and fair commitments from developing countries to reduce emissions intensity (UNFCCC 2007c). However, EU preferences for coverage of sectors under such approaches varied from

those of other developed countries. For example, EU preferred to include aviation and maritime emissions under EU ETS and under sectoral approaches at the international level in a global climate change agreement after 2012 (EEA 2007). However, the US was not optimistic about including those sectors. On the other hand, EU opposes the inclusion of LULUCF under EU-ETS or sectoral approaches, but the US supports the inclusion of LULUCF. According to the US Undersecretary of State, developing countries and the US are more likely to take on emissions reduction targets after 2012 if forestry and land use are considered eligible for emission credits (Point Carbon 2006). Indeed, the US expressed its interest in reaching an agreement on a post-2012 framework that could include a long-term global goal, mid-term goals and strategies, and nationally defined sector-based approaches for power generation (e.g. clean coal, nuclear, renewable energy), transportation, land use, energy efficiency, and adaptation by the end of 2008 among major economies including some developing countries (e.g. Brazil, China, India, Indonesia, Mexico, Republic of Korea, South Africa) (White House Council on Environmental Quality 2007).

Research institutions and think tanks also share positive views of including the sectoral approaches in the post-2012 regime. For example, CCAP (2006) suggested that the future framework should have absolute targets for developed countries plus no-lose intensity sectoral targets for developing countries. Pew Center (2007) considered that sectoral approaches might be a good alternative to economy-wide approaches and that such approaches should initially be explored in aluminium, cement, power and transportation sectors (Lewis and Diringer 2007). Ecofys proposed no-lose sectoral targets for developing countries and developed sectoral templates for industries such as cement (GtripleC and Ecofys 2007).

2.5 Relevance of and Barriers to Sectoral Approaches in Asia

Based on a preliminary review of emissions data from IEA in various sectors and an assessment of the overall feasibility for implementation of sectoral approaches, we consider that coal-fired power generation, iron and steel, cement and forest conservation sectors might be candidate sectors for consideration in Asia.

2.5.1 Coal-fired power generation

Many countries in developing Asia rely on coal as a major source of power. For example, coal accounts for more than 50% power generation in both China and India. IEA projections show that Asia will continue to depend on coal in the foreseeable future and that China and India will account for 44% of global coal-based electricity generation by 2030 with nearly USD one trillion investments (Watson et al. 2005). As Asian countries vary widely in plant efficiencies in terms of CO_2 intensity because of differences in coal endowments, reaching an agreement on a uniform CO_2 intensity target for the sector across the region or worldwide is difficult. For example, India has abundant sources of poor quality coal with high sulphur and ash contents, and obviously plant efficiencies are lower than in other countries. Further, in many Asian countries, such as China and Indonesia, the phase-out of less efficient coal-based power plants to achieve higher levels of sector-wide efficiency is slowed by a lack of alternative energy sources. In Indonesia and Viet Nam, for example, recently there has been a reversal from dependence on oil to coal, with increased oil prices and surging demand for oil by industrial and residential

As Asian countries vary widely in plant efficiencies in terms of CO_2 intensity because of differences in coal endowments, reaching an agreement on uniform CO_2 intensity target for the sector across Asia or globally is difficult.

sectors. Moreover, electricity is largely a good consumed domestically and any extra cost for this sector would be a burden on the domestic market. Therefore, aiming at uniform and gradual percent improvements on current intensity levels (e.g. 5-10%) may be more practical. However, even such a target may not be acceptable to countries such as Japan or Republic of Korea, which have already achieved high levels of efficiency. In view of this, sectoral approaches in the power sector should propose only realistic targets after seriously considering national circumstances and priorities.

2.5.2 Iron and steel

If synergies can be built with initiatives such as APP, which focus on deployment of new technologies, sectoral approaches in the steel industry hold promise. Likewise, if IISI can work with Asian governments in facilitating the phase-out of obsolete technologies, and if CDM can be restructured to provide adequate financial incentives, at least major steel firms in China and India may adopt sectoral approaches.

The iron and steel industry is the largest energy consuming manufacturing sector. China, the world's largest steel producer and consumer, accounts for 31% of global production. The demand for steel production is expected to grow considerably as many Asian countries are building new infrastructure. Lower fossil fuel use in the steel sector is associated with new technologies, high operating efficiencies, superior plant maintenance and larger plants with greater economies of scale (Watson et al. 2005). In terms of technologies, coke dry quenching is known to improve plant efficiency and lower emissions but the penetration of such technologies is very low in developing Asia (Table 2.2). Likewise, carbon capture and storage may be potentially useful but it would require significant investments in infrastructure. If synergies can be built with initiatives such as APP, which focus on deployment of new technologies, sectoral approaches in the steel industry hold promise. Integrated steelmaking process, which has much high emissions intensity than the electric furnace steelmaking, is common in several Asian countries. If a switch in the production process from integrated steelmaking to electric furnace steelmaking is supported by sectoral CDM or other incentive mechanisms, there is considerable scope to reduce emissions in the steel sector. However, cost implications must be carefully examined, especially if such a process switch is attempted in small steel plants. Furthermore, in most Asian countries, the steel industry is fairly fragmented with a large number of small producers. Emission intensity data in several Asian countries is unreliable, hence initial efforts must be focused on improving data quality. For example, the Chinese Iron and Steel Association does not report CO_2 emissions from steel making, and many Indian firms also do not collect such data. Recently, the IISI launched a task force to develop a global sector-specific approach for CO_2 reduction in the post-2012 regime (IISI 2007). If IISI can work with Asian governments in facilitating the phase-out of obsolete technologies through its CO_2 Breakthrough Programme, and if CDM can be restructured to provide adequate financial incentives for sectoral approaches in the post-2012 regime, at least major steel firms in China and India may adopt sectoral approaches.

Table 2.2 Diffusion rate of Coke Dry Quenching (CDQ) technology in China

Steel production per installation (Mt)	Number of companies	Total steel production in 2004 (Mt/year)	Estimated coke consumption (Mt/year)	Estimated CDQ treatment (Mt/year)	Estimated CDQ penetration rate (%)
>10	2	33	13	9.8	76
5-10	13	90	35	12	35
<5	NA	150	69	2.2	3
Total	NA	273	117	24.3	21

NA: Not available
Source: Jusen, unpublished, based on original data from China Steel Industry 2005 and Statistics of the China Steel Industry 2004

2.5.3 Cement

The potential for reducing GHG emissions from cement sector in developing Asia is extremely high in view of highly inefficient calcination process (conversion of limestone to lime to produce clinker). Indeed, 60% of CO_2 emissions are from the decarbonisation of limestone rather than the use of energy. Like the steel sector, however, the cement sector in developing Asia is characterised by a vast number of very small firms, mostly with energy intensive small-scale vertical kilns. For example, vertical kilns account for 75% of cement production in China, which is by far the largest cement producer in the world. The low density of cement demand in China's inner regions makes vertical kilns more attractive. Recently, however, the Chinese government has set an ambitious goal of replacing about 400 Mt of capacity currently based on vertical shaft kilns with dry kilns. If such goals can be supported through appropriate incentives, adoption of sectoral approaches in this sector holds great potential. Another characteristic of cement firms in Asia is that they use coal for burning in kilns. In India, for example, use of poor quality coal and wet rotary kilns are two main reasons for high CO_2 intensity (0.92 t CO_2 per ton of cement produced), as against Japan's best performance (0.73 t CO_2 per ton of cement produced) due to its exclusive use of dry kilns and very high operating efficiency (CCAP 2006).

Sectoral agreements in the cement industry to bring about changes in the operational efficiency of clinker manufacture or use of dry kilns (which in general have high capital costs) are likely to reduce GHG emissions significantly. However, the efficiency of the dry kiln process depends on the raw material used. For example, Tanaka et al. (2005) reported that limestone in China with high moisture content hinders the use of the dry kiln process. Thus it is important to consider various national and local circumstances in designing any sectoral baselines or targets. As cement is fundamental to construction and infrastructure development, developing countries in Asia are not likely to agree upon uniform emission intensity targets unless the right incentives such as sectoral CDM and technological and financial assistance are provided. Instead, several industry sources consider that a performance-based approach could initially be tried out within a country before extending across different countries. Collaborative research agreements to find an alternative binding agent to clinker may be particularly helpful in reducing emissions from the cement industry in Asia. The CSI of WBCSD has recently adopted the CSI CO_2 protocol for monitoring and reporting GHG emissions to enable the cement companies to produce consistent performance data. The CSI has three member firms from Asia (two from India and one from Thailand), and is now building the first database of CO_2 emissions from more than 1000 cement kilns, and key performance indicators for the cement industry. The experiences of Asian firms in providing the appropriate data to an independent third-party service provider to develop the database will go a long way in implementing sectoral approaches in Asia.

Several cement industry sources consider that a performance-based approach could initially be tried out within a country before extending across different countries. Collaborative research agreements to find an alternative binding agent to clinker may be especially helpful in reducing emissions from the cement industry in Asia.

2.5.4 Forest conservation

Many Asian countries have a keen interest in implementing sectoral approaches in the forestry sector. Recognising the seriousness of the impact of deforestation on global GHG emissions, international organisations and UNFCCC Parties agreed to consider a series of proposals (Table 2.1) to reduce emissions from deforestation and degradation (REDD), including funding activities through the use of trading carbon credits and

Although the growing interest in UNFCCC in providing incentives for forest conservation is encouraging to many Asian countries, adoption of sectoral approaches to deforestation avoidance or forest degradation faces many technical and policy challenges.

offsets (UNFCCC 2007b). FAO reported that the area of primary forest in Asia decreased at the rate of 1.5 million hectares per annum from 1990 to 2005 (FAO 2007). The growing interest in UNFCCC in providing incentives for forest conservation by valuing standing forests as carbon sinks is encouraging to many Asian countries, although there is wide variation in interpretation on modalities of incentive mechanisms.

Adopting a sectoral approach to the forestry sector in Asia in terms of deforestation avoidance or forest degradation faces many technical and policy challenges (e.g. whether the reference rate should be historical versus business as usual forecast, base year for deforestation monitoring, baseline methodology, market vs. non-market incentives, leakage, double counting with afforestation and reforestation CDM). In addition, adopting a uniform target for deforestation avoidance within a country or among countries is not easy because of significant differences in national circumstances, especially in terms of forest governance structures. Only when such challenges are addressed would it be feasible to implement sectoral approaches in forestry.

Other areas where a sectoral approach might be useful in Asia include sectors such as renewable energy (especially wind and solar energy), transportation (automotive sector), paper and pulp, as well as petroleum and chemicals.

All in all, several important barriers remain to be overcome to implement sectoral approaches in Asia. In the near future, uniform global/regional targets are unlikely to be accepted in any sector, due to country-specific differences in resource endowments, supply of raw materials, existing technology stock, industry structure, consumer preferences and regulations. Instead, a set percentage point reductions from current intensities within each country may be workable depending on the sector. Even in such cases, the lack of latest sector-specific data in all developing countries in general and LDCs and SIDS in particular is a major barrier. For this, capacity building to accumulate data in priority sectors is crucial. Moreover, private companies in several countries are hesitant to release commercially sensitive information. In such cases, data may need to be collected, compiled and monitored by third parties such as industrial associations, rather than governments.

Technical difficulties in baseline setting for a sector are another barrier to be overcome. Development of consolidated methodologies may be a starting point for constructing sectoral baselines (Watson et al. 2005). In case of adopting trans-national sectoral approaches, coordination with relevant organisations for each sector can be a major barrier. In such cases, UNFCCC and IEA may jointly lead such collaborative efforts. Further, as the potential generation of credits under sectoral approaches may be much higher than under CDM, it is important to ensure the viability of carbon market either by discounting of credits or by increasing the demand for credits through more stringent quantitative emission reduction targets by developed countries. IEA estimated that more than 3 $GtCO_2$-eq of credits could be generated by the energy sector alone if policies under consideration by governments were deemed eligible for crediting (Baron and Ellis 2006). If the price of carbon credits falls well below a reasonable value, nations may show little interest in adopting sectoral approaches.

2.6 The Way Forward

Based on our consultations, we conclude that there are many merits to pursue sectoral approaches in Asia, as they could present good bottom-up solutions to overcome imbalances and distortions in sectors and across countries. Further, it might be possible to achieve significant GHG reductions by engaging a relatively small number of countries. However, given the heterogeneity of market players, plant efficiencies, fuel mixes and regulatory environments across Asia, the mechanisms needed to implement sectoral approaches may have to vary from one sector to another and be structured in diverse ways ranging from voluntary to regulatory approaches. The targets may also have to be different depending on agreed priorities within each sector and country, ranging from absolute reductions to efficiency goals, best available technology performance standards or percent reduction in growth of GHG emissions. Ultimately, however, any sectoral approach employed must meet the criteria of environmental effectiveness, cost-effectiveness, equity and fairness, besides aligning its objectives with domestic policy priorities of developing Asia. In order to bring necessary GHG emission reductions on a global basis by 2020, the post-2012 regime should involve both absolute emission reduction targets for industrialised countries and sectoral approaches for all Parties to the UNFCCC. In industrialised countries, sectoral benchmarks can be used as building blocks for achieving economy-wide targets.

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Effective integration of sectoral approaches in a post-2012 climate regime requires considerable progress on at least three fronts; (a) step-wise institutionalisation of sectoral approaches at the national and international levels, (b) preferential support and reliable incentives for emission reductions achieved through sectoral approaches; and (c) sector-specific initiatives by multinational corporations (MNCs).

Implementation of sectoral approaches at the national level requires undertaking a series of steps that are comparable to those taken to implement CDM. As a first step, substantial efforts are needed to gather data to better understand the overall performance of each sector and its potential for improvement in each country. Secondly, the guidelines for determining emissions intensities in priority sectors (e.g. steel, cement) must be developed by IEA based on experiences from current initiatives by IEA, APP, WBCSD, IISI and others. However, while developing such guidelines, local and national circumstances must be carefully considered. For example, establishing valid data records from the energy emissions and technology standpoints is a major challenge in developing countries such as China and India, which have large number of industrial installations. Therefore, local technical institutions and independent experts in each country must be fully involved in data collection and baseline setting. Analysis of domestic institutional changes required to implement sector-specific approaches and strengthening of relevant institutional and human capacities are also crucial at the national level.

As a first step for institutionalizing sectoral approaches, it is necessary to gather data to grasp the overall performance of each sector and its potential for improvement in each country. The guidelines for determining emission intensities in priority sectors must be developed by IEA based on experiences from current initiatives by IEA, APP, WBCSD, IISI and others.

When certain countries accumulate intensity data in chosen sectors for a minimum of 2-3 years in a consistent manner, an independent international review panel may accredit data collection procedures for determining current sectoral intensity levels. Those countries wishing to benefit from the sectoral crediting mechanisms by agreeing to no-lose targets should report sectoral intensity data at sub-national levels in their national communications following an amendment to the UNFCCC Article 4.1/12. On the basis of an in-depth review of sectoral intensity data by an international committee of experts based on "Best Available

Technology in the region (within the country)", necessary data adjustments could be made at sub-national levels, in order to ensure that target setting leads to net emission reductions. Using such data at the sub-national level, the private sector alone or along with local and/or national governments may propose a no-lose target and policies and measures to achieve such a target. All emission reductions beyond the target level may be banked for eventual crediting. Further amendments to the UNFCCC may be necessary, if the sectoral target setting process is to be institutionalised in the above manner.

Synergies between the UNFCCC and non-UNFCCC initiatives such as APP are crucial for data collection, establishment of sectoral benchmarks and identification of potential pilot projects.

Several participants in our consultations stressed that the UNFCCC should be the central forum to institutionalise sectoral approaches at the international level. However, some participants were concerned that the UNFCCC is not necessarily the best forum to address a range of sectors and the related technical details, given its limited sector-level expertise. Therefore, it is important first to build synergies between the UNFCCC and non-UNFCCC (e.g. IEA, International Civil Aviation Organization (ICAO), International Maritime Organization (IMO), International Tropical Timber Organization (ITTO), Food and Agriculture Organization of the United Nations (FAO), or APP, G8, Group of Twenty (G20), Organisation for Economic Co-operation and Development (OECD), Asia-Pacific Economic Cooperation (APEC), Major emitters group) initiatives to overcome this barrier, especially for data collection, establishment of sectoral benchmarks and identification of potential pilot projects. Such synergies can also be helpful in information sharing on technologies and best policy practices including regulatory issues in different sectors. The work of APP task forces could be especially useful in gathering relevant data in China, India and the Republic of Korea. For example, the action plan of the steel task force of APP aims to develop sector-relevant benchmarks and performance indicators, which could be a useful starting point for implementing sector-specific approaches under the UNFCCC. Similarly, the CSI aims to establish country baselines upon negotiation with governments to form the basis of intensity-based objectives and a baseline-and-crediting system in the cement sector (Baron et al. 2007). Both the UNFCCC and the external processes thus have a great role to play in sectoral approaches, but the greater negotiating burden on the UNFCCC may prove challenging (WRI 2007).

The lessons learned from the expansion of project-based CDM to programmatic CDM, which was approved at COP11 in 2005, will also be useful in structuring sectoral approaches. For example, the CDM Executive Board recently decided to credit clean coal technologies in power generation in China. Here, the number of credits would be computed as the difference in emissions between the proposed new plant and the "top 15 performing power plants that have been constructed in the previous 5 years". The experiences in data collection, baseline determination and crediting in such projects would be valuable in institutionalising sectoral approaches. Likewise, the experiences from pilot projects of the World Bank's CPF would also be relevant. Ultimately, however, some form of integration of sectoral approaches, and inter-sector coordination at the international level is necessary.

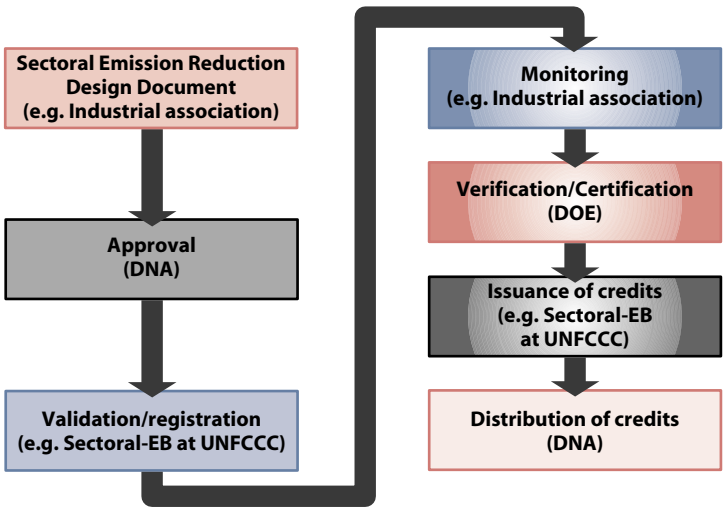
We suggest two options for adoption of sectoral approaches in Asia: (a) expansion of project-based CDM to sectoral targets with partial discounting of CER, and (b) introduction of voluntary carbon market with sector-specific funds.

Based on consultations held in China and India, we suggest two options for adoption of sectoral approaches in Asia: (a) the expansion of project-based CDM to sectoral targets with partial discounting of CER (Yamagata 2004, Chung 2006); and (b) the introduction of a separate carbon market with "sector-specific funds". In the first option, credits from sectoral approaches could be made fully fungible with the Kyoto credits, and CDM-EB under the Kyoto Protocol would be expected to verify and issue CER, after applying

necessary discounting level. All Parties to the UNFCCC may sell such credits in the international emissions trading market under the Kyoto Protocol. However, this option may face difficulties in reaching an agreement on discounting level for credits generated from sectoral approaches.

In the second option, credits generated from sectoral approaches are not fungible with the Kyoto credits. Similar to the CDM Executive Board, another new Executive Board for management of sectoral approaches, with specific expertise on technical, institutional and political aspects of priority sectors, would need to be established in the UNFCCC to validate and issue credits generated from sectoral approaches (Figure 2.2). Sectoral credits may be sold to all parties of the UNFCCC. In addition, the specific sectors that are eligible for sectoral crediting would be made ineligible for CDM under the Kyoto Protocol in order to avoid double counting of credits. However, if some host countries decide not to avail themselves of sectoral crediting in some specific sectors, projects from those sectors and countries could continue to be eligible for CDM. Those developing countries which adopt sectoral approaches for GHG mitigation through a pledge and review system, are given additional incentives to preferentially access "sector-specific funds", which are newly created with (a) voluntary contributions from Annex I countries, (b) a certain share of proceeds from international emissions trading employing sectoral approaches, and (c) a certain share from sector-specific funds to be established by the GEF and multilateral financial institutions such as the World Bank. The "sector-specific funds" may initially be jointly managed by the UNFCCC, World Bank and IEA until operational modalities are fully decided by the COP. In addition, an expert group on sectoral approaches may be established to help develop and review proposed sectoral approaches. The institutional arrangements for sectoral approaches may be periodically reviewed to ensure environmental integrity, cost-effectiveness, equity and fairness.

Figure 2.2 A suggested institutional structure for implementation of sectoral approaches



Additional sector-specific incentives in the form of finance, technology transfer and strengthening of institutional and human capacities may be provided to those countries that deliver sector-specific emission reductions in a measurable, reportable and verifiable manner. In addition, MNCs operating in developing countries may take the lead in demonstrating ways to reduce GHG emissions in specific sectors. Indeed the idea of GHG emission caps for MNCs was raised long ago in 2000 by the current UNFCCC Executive

Additional sector-specific incentives in the form of finance, technology transfer and strengthening of institutional and human capacities may be provided to those countries that deliver sector-specific emission reductions in a measurable, reportable and verifiable manner.

Secretary Yvo De Boer but progress has been slow, perhaps due to complexities associated with decisions on the types and stringency of targets and allocations of allowances.

Analysis of the current trends of international climate negotiations and potential barriers to adoption of sectoral approaches suggests that sectoral approaches could not fully replace existing market mechanisms, and that both sectoral approaches and economy-wide targets should co-exist and complement each other. However, in order to realise large-scale emission reductions through both sectoral approaches and economy-wide targets, it is important to provide a clear price signal on carbon emissions by creating a consistently high demand for credits, through setting deeper global GHG emission reduction targets.

The effective operationalisation of sectoral approaches in the future climate regime will depend greatly on the extent of reconciliation of perspectives of developed and developing countries.

The foregoing analysis of competing interpretations of sectoral approaches suggests that further work is necessary to bridge the gaps in understanding of developed and developing countries. Although a principal goal of sectoral approaches is to promote the use of best practices in internationally competitive industries, developed countries seem to be primarily interested in sectoral approaches as a way to broaden the participation in the future climate regime, while developing countries view sectoral approaches as a means to secure technology and funding for sustainable development in high priority sectors. The effective operationalisation of sectoral approaches in the future climate regime will, therefore, depend greatly on the extent of reconciliation of perspectives.

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Chapter 3

International Technology Cooperation for Addressing Climate Change: Political Feasibility and Implications for Asia

Chapter 3

International Technology Cooperation for Addressing Climate Change: Political Feasibility and Implications for Asia

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3.1 Introduction

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Development, transfer and deployment of low-carbon technologies make up one of the four building blocks of the future climate regime (the others being mitigation, adaptation and financing). Institutionalisation of technology transfer mechanisms at the international level has been a major demand of developing countries for a long time and it is likely to remain an important issue for negotiations in the future.[1] Through a series of national, sub-regional and regional consultations, we identified various types of barriers to collaborative technology development and transfer in Asia (IGES 2005, Srinivasan 2006). The barriers included high cost and capital intensity, the insufficiency of financing and investment, the unsatisfactory enabling environment, the rigidity of intellectual property rights (IPRs) regime, mismatch between technological needs and supply, limited domestic human capacity, and the lack of capacity in domestic institutions for adaptation, sustenance and dissemination of low-carbon technologies. Some stakeholders pointed out that most of the technologies developed to date are not based on considerations of natural resource endowments of developing countries. To overcome such barriers, many ideas and proposals were put forward, and these were reviewed in detail in our earlier report (Tamura 2006a). However, very few of these proposals considered the political and institutional feasibility of their implementation. Indeed, building political consensus on how to deploy new and existing low-carbon technologies in developing countries, while protecting the financial and intellectual property interests of those owning the technologies, will require significant creativity and reconciliation.

This chapter focuses on the political feasibility of selected post-2012 regime proposals for strengthening technology cooperation and assesses their implications for Asia. Political feasibility of policy proposals can be characterised as a policy proposal being acceptable enough to a majority of parties so as to overcome resistance that would inhibit the policy's adoption and/or implementation (de Coninck et al. 2007). Instead of directly asking whether a proposal is acceptable or not, this chapter looks at the issues of "participation" and "compliance", and examines how and to what extent each policy proposal is designed to address these issues. Participation refers to whether a state becomes a party to an international agreement, and compliance means the degree to which a state that is a party to such an agreement implements the obligations of the agreement. Any international technology cooperation for addressing climate change needs to be sustained long enough to deliver on environmental effectiveness. Adequately addressing the issue of participation and compliance is, therefore, critically important.

After briefly assessing the status of international technology cooperation for climate change, proposals in three priority areas, where future discussions can make a difference

1. At COP13 held in Bali in December 2007, the importance of technology development and transfer was again recognised and the Expert Group of Technology Transfer (EGTT) was given new mandates to develop recommendations for strengthening technology transfer.

to achieve the goal of rapid uptake of low-carbon technologies especially in developing Asia, are examined. Drawing from international relations/political science literature as well as empirical cases of China's experience with the Montreal Protocol on Substances that Deplete the Ozone Layer, an analytical framework is developed. Then, the political feasibility of each proposal is assessed in terms of how each addresses the issue of participation and compliance. The chapter concludes by suggesting the way forward to enhance the political feasibility of international technology cooperation under a future climate regime.

3.2 Status of International Technology Cooperation

A detailed assessment of the status of international technology cooperation in climate regime was given in our previous report (Srinivasan 2006), where we examined how different articles of the United Nations Framework Convention on Climate Change (UNFCCC) (Articles 4.1, 4.3, 4.4, 4.5 and 4.7) and its Kyoto Protocol (Articles 3.14, 10 (b), (i) and (c), and 11.2), and various decisions of the Conferences of the Parties (COPs) to the UNFCCC (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) referred to promoting international cooperation in development, transfer and deployment of technologies. The Global Environment Facility (GEF), which is the main financial mechanism of the Convention, disbursed about USD 250 million per year to support energy efficiency improvement, enhancement of the use of renewable energies, and sustainable transportation projects in developing countries. However, technology transfer in these projects was considered minimal. Likewise, after assessing the role of funds such as the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDC Fund) in promoting technology cooperation, it was concluded that the efforts by the UNFCCC and the GEF were of modest significance at best (Tamura 2006a).

The clean development mechanism (CDM) under the Kyoto Protocol was meant to facilitate technology transfer indirectly, but stakeholders in our consultations repeatedly pointed out that there were very few projects where such transfer was seen, especially for technologies with high GHG mitigation potential. As per the claims on technology transfer made by project developers in their project design documents, roughly one-third of all CDM projects involved technology transfer (Haites et al. 2006). Natsource[2] also reported that the Netherlands (landfill gas projects), France (N_2O reduction), Spain and Denmark (wind energy) shared their expertise in setting up several CDM projects in developing countries, which also contributed to technical capacity in the host countries. Several researchers, however, indicated that the administrative complexity of project-based mechanisms restricted the ability to bring about technology shifts in developing countries (Bell and Drexhage 2005), and that incentives to develop more advanced technology on a long-term basis were weak (Sandén and Azar 2005). In Asia, the predominance of unilateral CDM projects (especially in India), and HFC destruction projects that produce a large amount of certified emission reductions (CER) (especially in China and the Republic of Korea) also indicates very limited prospects for effective technology transfer from developed countries.

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2. http://www.ecn.nl/en/ps/news/item/article/177/1280/

In our previous report, we examined the role of plurilateral and bilateral technology initiatives (e.g. International Energy Agency (IEA) implementing agreements, Asia-Pacific Partnership on Clean Development and Climate (APP), Methane to Markets Partnership (M2M), Gleneagles Plan of Action on Climate Change, Clean Energy, and Sustainable Development) outside the UNFCCC. This is an area where the US launched several technology-oriented initiatives after withdrawing from the Kyoto Protocol. We noted some positive results through such efforts (e.g. supply of power generation equipment for a 120 MW coal bed and coal mine methane power plant in China through the M2M Partnership). However, such cooperation, which is usually seen as the most feasible option for US international leadership, is not immune to implementation problems (Tamura 2006b).

While both UNFCCC and non-UNFCCC initiatives may potentially enable Asian countries to access climate-friendly technologies, more effective forms of technology cooperation need to be developed.

In sum, while both UNFCCC and non-UNFCCC initiatives may potentially enable Asian countries to access climate-friendly technologies, more effective forms of technology cooperation need to be developed. Any form of international cooperation, first of all, needs to ensure the participation of states, and also requires participating states to adjust their policies according to agreements and make such commitments credible (Keohane 1984). Policy proposals for international technology cooperation, thus, need to give adequate attention to the issues of participation and compliance.

3.3 Three Priorities for Strengthening Technology Cooperation

Based on multi-stakeholder consultations in Asia, we recognised three priority areas where future climate regime discussions can make a difference to achieve the goal of rapid uptake of low-carbon technologies. These are improving finance, building synergies between the UNFCCC and the non-UNFCCC initiatives, and enhancing the flexibility of IPRs for low-carbon technologies. This section examines the relevance of two proposals for each priority area. The choice of proposals is based upon opinions of participants in our consultations and observation of international discussions.

3.3.1 Improving finance to accelerate technology cooperation

Currently, funds available under the UNFCCC are not large enough, and the price signals under the Kyoto Mechanisms are still too weak to mobilise the amount of capital on the scale required.

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. Further, the price signals under the Kyoto Mechanisms are still too weak to mobilise the amount of capital on the scale required. Therefore, several ideas were put forward for securing financial resources for technology research and development (R&D) and transfer.

One approach is to increase financial contributions to technology cooperation as part of commitments by Annex I countries under the Kyoto Protocol. The Sao Paulo Proposal, an outcome of the BASIC Project, recommends a Technology Funding Mechanism, wherein funds are secured by imposing a 2% levy on international transfers of all carbon credits except CER (i.e. Assigned Amount Units (AAUs), Emission Reduction Units (ERUs) and Removal Units (RMUs)) and by allowing financial contributions as part of legally-binding commitments of Annex I Parties (BASIC 2006).[3] The Mechanism may support non-Annex

3. The Sao Paulo Proposal suggests that each Annex I Party should convert its legally-binding emissions reduction commitment into a combination of an absolute emission limits (tCO_2e/year), emissions intensity limits (tCO_2e/ unit GDP), and new and additional funding (USD per year) to a maximum of 10% of its commitments.

I Parties participation in international R&D initiatives of mitigation and adaptation technologies, and may also undertake such initiatives directly. Based upon requests from non-Annex I Parties, it may also be used to buy relevant technologies for widespread dissemination in developing countries.

Another proposal is to establish a protocol for a global technology R&D fund (Barrett 2003). In this scheme, developed countries would be expected to contribute funds based upon the principle of ability and willingness, as in the UN scale of assessments, or upon the measures of each country's historical responsibility for climate change or current GHG emissions. This funding scheme, Barrett recommends, should build in a strategy of reciprocity. Namely, if country *i* accedes, then all the other parties will increase their funding by a specific amount. On the other hand, if *i* withdraws, the others will lower their funding. Barrett proposed a similar mechanism for technology transfer (as opposed to technology development) akin to the Montreal Protocol's Multilateral Fund.

3.3.2 Building synergies between UNFCCC and non-UNFCCC initiatives

Technology development and transfer is a cornerstone of several new non-UNFCCC initiatives such as APP. However, initiatives to build synergies between UNFCCC and non-UNFCCC initiatives are still lacking. One approach is to make project and/or programme activities with significant technology components under non-UNFCCC initiatives eligible for preferential treatment under the CDM. For example, synergy can be built in a process through which the M2M Partnership facilitates a better access to markets for coal mine methane project developers in China. As the climate regime provides unique CDM opportunities in methane recovery and additional income for project developers, many providers of coal mine and coal bed methane recovery technology, who are also members of the M2M Partnership, recognised the potential for carbon revenue (Point Carbon 2006). However, it remains to be seen if M2M-sponsored projects contravene CDM additionality rules.

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Another approach to encourage synergies is through sector-based technology standards (Barrett 2003), energy efficiency standards (Ninomiya 2003) or a sector-based crediting mechanism (Schmidt et al. 2006). Internationally-agreed technology targets or efficiency 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. These proposals explicitly or implicitly assume the reference to best available technologies or relative energy efficiency in specific sectors across countries. To compare the relative energy performance of industries, however, it is necessary to recognise that individual technologies, qualities of feedstock and products are often different in various countries even for the same industry. Reliable comparisons also require that the quality of data should be ensured and continuously updated. System boundaries and definitions also need to be uniform. However, there has been no common methodology for such comparisons so far. Against this backdrop, the G8 Gleneagles Plan of Action mandated the IEA to take an initiative in assessing industrial energy efficiency worldwide (IEA 2007). The two task forces of the APP, those of the steel and the cement sectors, also began to establish common methodologies for setting energy-efficiency benchmarks in each sector. Likewise, the Cement Sustainability Initiative of the World Business Council for Sustainable Development (WBCSD), and the task force of the International Iron and Steel Institute (IISI) have begun to develop global sector-specific approaches for emission reductions.

Development of reliable methodologies for benchmarking through the non-UNFCCC initiatives could become an important building block of a post-2012 climate regime, if it adopts sector-based commitments. Some initial progress along these lines has been evident in the "Bali Action Plan" agreed upon at the recently concluded COP13 in December 2007. The Ad Hoc Working Group on Long-term Cooperative Action under the UNFCCC, a newly established body at COP13, agreed to address "cooperative sectoral approaches and sector-specific activities". Even if sector-based commitments are not fully adopted in a post-2012 regime, a sector-based benchmarking methodology can contribute to the development of a technology-based and bottom-up approach for differentiating national emissions targets.[4] In a nutshell, energy-efficiency benchmarks and emissions reduction potentials that non-UNFCCC sector-based initiatives are developing can serve as a foundation for concerted future actions under the UNFCCC.

3.3.3 Enhancing flexibility of intellectual property rights for low-carbon technologies

There are sharp disagreements between developed and developing countries with regard to treatment of IPRs for low-carbon technologies.

There are sharp disagreements between developed and developing countries with regard to treatment of IPRs for low-carbon technologies. For example, shortening the duration of IPR protection was repeatedly raised by developing country participants in our consultations, while participants from developed countries argued that technology developers need to recuperate the costs for R&D over time. One approach to reconcile such disagreements 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. As mentioned earlier, the Sao Paulo Proposal suggests the creation of the Technology Funding Mechanism, which could be structured to facilitate the participation of developing countries in international R&D initiatives (BASIC 2006). Another idea is to create an international association that coordinates and develops new technologies, thereby holding IPRs in a pattern similar to that of the Consultative Group on International Agricultural Research (CGIAR) (Ogonowski et al. 2004). Establishment of a new international fund for purchasing and dissemination of climate technologies has been proposed by developing countries at UNFCCC.

An approach to enhance the flexibility of the IPR regime for already commercialised technologies is along the lines of approaches taken to combat HIV/AIDS (e.g. compulsory licensing) (Ockwell et al. 2007, Ogonowski et al. 2004). One participant in our consultations suggested that the US Clean Air Act might be a better example than HIV/AIDS to pursue compulsory licensing and deployment of low-carbon technologies.[5] The BASIC project also suggested another approach to utilise the proposed Technology Funding Mechanism to buy out IPRs, and make privately-owned, climate-friendly technologies available for deployment in developing countries. This approach was similar to the proposal of a Multilateral Technology Acquisition Fund, as recommended by the South African Ministerial Indaba on Climate Action in 2006.[6]

4. This is similar to so-called "triptych" approach that was developed in the context of internal EU negotiations about allocation of the EU's Kyoto target among member states.
5. Section 308 of the Clean Air Act provides a mechanism by which such a non-complying party may obtain a patent license where it has been unsuccessful in its attempts to obtain a license on its own.
6. Available at http://unfccc.int/files/application/pdf/20060626_indaba.pdf

3.4 Political Feasibility of Technology-oriented Proposals

Drawing upon basic analytical frameworks of International Relations, this section outlines two perspectives on political feasibility of international technology cooperation. One perspective focuses on international incentive mechanisms for participation and compliance. The other examines domestic political processes through which a decision on participation is made and actual implementation occurs. It also examines how successful examples of China's participation in, and implementation of, the Montreal Protocol on substances that deplete the Ozone layer benefited from both international incentive mechanisms and domestic interests. The Montreal Protocol is taken as an example because it is often seen as successful in terms of both the participation of major developing countries and the rapid uptake of non-Chlorofluorocarbon (non-CFC) technologies. While there are alternative explanations for its success (e.g. the Dupont Hydrochlorofluorocarbon [HCFC] claim (Oye and Maxwell 1994) and the epistemic communities claim (Haas 1992)),[7] it is reasonable to conclude that implementation of the actual agreement and uptake of non-CFC technologies occurred largely because of incentives and a close fit with domestic interests. Theoretical and empirical arguments suggest the importance of structuring an international agreement that is self-enforceable, includes side-payments, appeals to domestic interest groups, and is capable of overcoming domestic administrative fragmentation.

Theoretical and empirical arguments point to the importance of structuring an international agreement that is self-enforceable, includes side-payments, appeals to domestic interest groups, and is capable of overcoming administrative fragmentation.

3.4.1 Systemic-level perspectives on the feasibility of technology cooperation policy: Incentive structures at the international level

A systemic-level approach focuses on the question of how states calculate gains from cooperative arrangements under international anarchy, namely in the absence of a centralised authority to enforce promises or provide protection among states. This approach is based upon a key assumption that states are unitary-rational actors whose core interest is not only to improve their well-being but also to attain survival and independence.[8] The effect of anarchy on the behaviour of the state is assumed as follows: (a) states worry that partners may cheat them and be free-riders, and (b) states are concerned that gains from cooperation may favour partners in relative terms. These assumptions lead to two distinct propositions.

A systemic-level approach suggests that a state agrees with and adheres to an international agreement if its collaborative arrangements are expected to make the state better off, and produce "balanced" achievements of gains.

P_1: International cooperation needs to be self-enforced–i.e. the cooperation should be incentive-compatible so that states reach and adhere to agreements, because doing so is in their interests (Barrett 2003).

P_2: A state will decline to join, will leave, or will sharply limit its commitment to a cooperative arrangement if it believes that gaps in otherwise mutually positive agreements favour partners (Grieco 1990).

Political feasibility can therefore be examined, on the one hand, in terms of how international arrangements could create incentives for participation or disincentives for defecting from agreements, and on the other hand, to alleviate states' concerns

7. The former emphasises the coincidence with producer interest, and the latter focuses on transnational diffusion of norms and ideas through "epistemic communities", defined as a network of experts who share common policy goals, concerns over issues, and specialised knowledge.
8. A state as a unitary actor means that a state is regarded as a united front and in full control of its society. In other words, a state is seen as a "black box."

over gaps in gains. The Montreal Protocol provided two incentive mechanisms: trade restrictions between signatories and non-signatories in the ozone-depleting substances (ODS) controlled by the treaty, and compensation to developing countries for covering "incremental costs" of complying with the agreement through the Protocol's Multilateral Fund (MLF). Barrett argues that "[it] is really the combination of carrots and sticks that succeeded in protecting the earth's ozone layer" (Barrett 2003: 351).

Indeed, the MLF was a key driving force in China's ratification of the Montreal Protocol, as the Protocol had the potential to hurt many growing industries such as household refrigerators, fire protection and foams. Besides being the largest ODS consumer and producer among developing countries, China lacked the financial and technical capabilities to substitute other chemicals for ODS. Therefore, it insisted that developing countries could not afford the costs of CFC abatement since they needed to address more pressing domestic issues such as poverty alleviation (Zhao and Ortolano 2003). After heated negotiations, the 1990 London Amendments to the Montreal Protocol established a new mechanism for transferring funds and technologies to developing countries (i.e. the MLF). In 1991, China finally ratified the London Amendments.

With regard to the adoption of non-CFC technologies in China, another study presented additional insights. While the MLF helped domestic market-oriented industries in China gradually adopt reduced-CFC technologies, it was market pressures from international trading partners that much more rapidly motivated export-oriented household refrigeration manufactures to adopt such technologies (Zhao and Ortolano 1999). Environmental labelling restrictions in export markets worked as a major force in causing many Chinese refrigerator manufacturers to stop using CFCs. This study provides an implication for the systemic-level approach. Once it makes unequivocal economic sense to join a technology diffusion agreement, targeted technologies could become standards (Barrett 2003). In that case, joining agreements and following standards would be a better strategy than non-participation.

In short, this systemic-level approach suggests that a state agrees with and adheres to an international agreement if its collaborative arrangements are expected to make the state better off, and produce "balanced" or "equitable" achievements of gains. This approach provides two indicators. One is the existence and magnitude of incentives: whether and how an international agreement can create a situation where states find it beneficial to adhere to the agreement's provisions. The other is the extent to which international technology cooperation is designed to offer side-payments. The provision of such side-payments is expected to mitigate inequities rising from cooperative arrangements.

A domestic-level approach allows for the possibility that a government, however sincere about its international commitments, may be unable to deliver because of domestic political or administrative constraints.

3.4.2 Domestic-level perspectives on political feasibility

Unlike the systemic-level approach which regards the state as a unitary actor pursuing aggregate, national interests, a domestic-level approach opens up the "black box" of the state and examines domestic political interactions through which decisions on participation and implementation occur. Various actors, including central government bureaucracies, local governments and industries are involved in such interactions, and they have different, potentially conflicting objectives. This approach allows for the possibility that a government, however sincere about its international commitments, may be unable to deliver because of domestic political or administrative constraints.

The domestic-level approach is built upon four major assumptions: (a) the state is seen as an institutional structure, where decisions and policies are formed through a series of political interactions over which no single actor has full control; (b) domestic political structures partly define the distribution of authority and power among actors; (c) domestic actors develop their policy preferences in terms of the degree to which a policy serves and satisfies their fundamental objectives or interests, but their preferences sometimes differ, and none will necessarily be fully consistent with that of the nation or state at large, and (d) the perspectives and interests of domestic actors are largely shaped by their role and position.

Taken together, these assumptions suggest that implementation and compliance are subject to the domestic distribution of costs and benefits caused as well as the distribution of authority and power over domestic policy-making and implementation processes. Two propositions are as follows:

P_3: It is easier to domestically implement those international commitments that offer tangible benefits to some specific groups while costs are widely dispersed throughout society. Conversely, it is harder to carry out those commitments that impose disproportional costs on specific sectors or groups even though benefits are widely dispersed.

P_4: Domestic implementation of international commitments becomes more difficult in an issue/area where authority over policy-making and implementation processes is fragmented.

Here, China is considered an example to examine domestic perspectives of political feasibility of international technology cooperation. In China, central government bureaucracies are at the core of planning and policymaking, while local government authorities play a pivotal role in implementation. These bureaucratic organisations have their own organisational goals: (a) to defend the essential mission or purpose of the bureaucracy; (b) to defend/expand the bureaucratic "turf"; (c) to maintain organisational autonomy; (d) to maintain morale within the organisation (which serve to make sure the organisation functions well), and (e) to make sure that the organisational budget grows (Halperin and Kanter 1973). International agreements can be utilised to strengthen bureaucracies' autonomy and improve their maneuverability over domestic politics (Putnam 1988).

In China, central government bureaucracies are chiefly responsible for planning and policymaking, while local government authorities play a pivotal role in implementation.

Several studies concluded that implementation of the Montreal Protocol fit the interests of China's principal implementing agency. Given the inter-agency rivalries, the National Environmental Protection Agency (NEPA) had a particular interest in implementing the Montreal Protocol effectively (Zhao and Ortolano 2003).[9] It was the Ministry of Foreign Affairs, not NEPA, which had previously involved authorities to participate in negotiations over multilateral environmental agreements. In addition, NEPA did not regulate the domestic implementation of multilateral environmental agreements. By demonstrating its capability to effectively implement the Protocol, NEPA saw the possibility to extend its domain. Working with the MLF also gave NEPA access to administration and power to allocate MLF money. Thus, NEPA believed that the Montreal Protocol could provide an

9. The NEPA was upgraded to a full ministry and renamed the State Environmental Protection Administration (SEPA) in 1998.

opportunity to extend its authority over international negotiations, enhance its domestic execution of Multilateral Environmental Agreements (MEA), and reinforce its domestic political position.

With regard to the domestic political structure of China, fragmentation is a key feature. The fragmentation of authority for economic (Lieberthal and Lampton 1992, Lieberthal and Oksenberg 1998, Oksenberg and Economy 1998, Ohshita and Ortolano 2006) and environmental (Jahiel 2000) policymaking in China is well-documented. Furthermore, it was argued that the reforms beginning in the late 1970s accelerated such fragmentation. The decentralisation of budgetary authority, for instance, made many locales less sensitive to the policy demands from higher levels or central government. Consequently, institutional fragmentation and a lack of sufficient authority, combined with prevailing local interests in economic development, proved to be the main constraints for domestic implementation of international commitments (Ohshita and Ortolano 2006). The other developing countries in Asia also suffer from similar, if less severe, problems with administrative fragmentation and the related complex of predicaments that hinder environmental regulations in rapidly growing economies (Chan 1993, Eder 1996, Rock 2002, Heller and Shukla 2003).

Overcoming institutional fragmentation is critical...though NEPA was reluctant to relinquish its privileges in MLF funding management, it recognised the problems caused by excluding local environmental protection bureaus.

Overcoming such institutional fragmentation is critical. As previously mentioned, NEPA initially managed preparation and submission of the MLF proposal, and implemented individual MLF-supported projects. However, implementation of the MLF suffered, since local environmental protection bureaus (EPBs) were not involved in the process. It was local EPBs that had access to data on ODS consumption and production, especially from small and medium-sized enterprises. Likewise, it was local EPBs that enforced regulations issued by NEPA. Even though NEPA was reluctant to relinquish its privileges in MLF funding management, it recognised the problems caused by excluding local EPBs. Finally, local EPBs were integrated into the administrative structure for policy implementation, which facilitated the domestic process of applying for the MLF (Zhao and Ortolano 2003).

This line of thought suggests two elements of political feasibility: (a) the degree of which policy outcomes appeal to, or diverge from, the interest of key actors at the implementation stage; and, (b) the degree of fragmentation of authority in a policy-making process under specific technology cooperation. The domestic political process perspectives on political feasibility discussed above are summarised in Table 3.1, along with the systemic-level perspectives discussed previously. The next part of the section will consider how each proposal addresses the identified indicators of political feasibility.

Table 3.1 Key elements of political feasibility

International level	
1. Self-enforceability	How and to what extent can international arrangements create a situation where participation and compliance are in the interest of states?
2. Provision of side-payments	How and to what extent do international arrangements compensate to mitigate inequities rising from cooperative arrangements?
Domestic level	
3. Fit with domestic interests	To what extent do expected outcomes of international cooperation appeal to, or diverge from, the interest of key actors in implementation?
4. Domestic institutional fragmentation	To what degree is authority in the domestic policy-making process under specific technology cooperation fragmented?

3.5 An Assessment of the Political Feasibility of Selected Proposals

3.5.1 Proposals for improving financial capacity

Enhancing financial contributions to collaborative R&D and technology transfer as part of legally-binding commitments by Annex I countries would give Annex I countries greater flexibility.

The proposal of enhancing financial contributions to collaborative R&D and technology transfer as part of legally-binding commitments by Annex I countries aims at providing stimulus for technology development and transfer, while preserving the basic structure of the Kyoto Protocol. The proposal gives Annex I countries greater flexibility in achieving their commitments, as each developed country could determine its own mix of emission reduction and financial commitments. Such an expansion of flexibility can be seen as a compensation mechanism for the countries subject to legally-binding emissions reduction commitments. However, the basic structure of the Kyoto Protocol on which this proposal is built poses a challenge to self-enforceability of commitments by Annex I countries. Some scholars argue that the Kyoto Protocol has the enforcement problem, since it does not provide sufficient incentives to secure participation and compliance (Victor 2001, Barrett 2003, Hovi et al. 2003, Nentjes and Klaassen 2004).

The above proposal may appeal to the recipients of technology at the domestic level in developing countries. The modality of how information on available funds is shared and disseminated among local governments and industries, however, has significant implications for effective implementation. As China's experience with the MLF showed, the lack of adequate involvement of local stakeholders can lead to political obstruction.

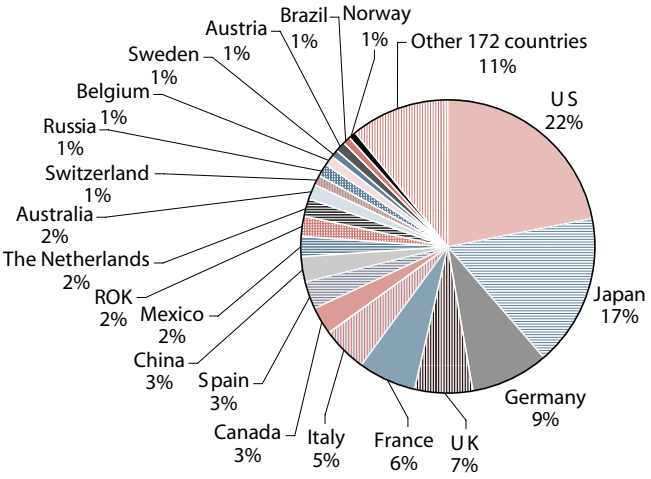
For Annex I countries, however, domestic responses may be mixed. The proposal may appeal to the developers of low-carbon technologies that anticipate new opportunities for exporting such technologies. However, the idea of financial contributions as part of legally-binding commitments is likely to face opposition from finance ministries. Indeed, in Japan, the Financial System Council of the Ministry of Finance expressed concerns over the cost of purchasing emission allowances from abroad to meet the Kyoto target, which was estimated at JPY220 billion to 1.2 trillion (*Ecology Express* 26 October 2007, 19 November 2007). In many developed countries, reconstruction and maintenance of sound fiscal status are now major policy priorities, and finance ministries have organisational interests to pursue such priorities.

With regard to the global R&D fund proposal, the financial contribution is based upon three conditions: (i) an agreed total expenditure level; (ii) a share for each country determined by its circumstances (shares may be based on the UN scale of assessments or historic and/or current emissions, and so on); and (iii) the other countries' contributions (Barrett 2003). Proponents of the global R&D protocol deliberately address the enforcement problem, by arguing that a funding contribution scheme should build on a strategy of reciprocity, which could create incentives to participate. Furthermore, the idea of sharing costs of R&D itself also provides incentives for both developed and developing countries. However, the modality for determining a share for each country's contribution might give rise to a relative gains problem. If the UN scale of assessments is adopted to define shares of financial contribution, burdens of cost-sharing would be concentrated in a few countries. As Figure 3.1 shows, the current share of the US and Japan amounted to nearly 40% of the total UN regular budget in 2007. Such a high portion of cost-sharing for R&D may raise concerns about fairness, especially when the amounts involved are large. Even if the share of contribution is to be based on each country's historical and

Implementing the global R&D fund thus presents a dilemma: the greater the amount of the fund needed, the less likely the participation from major contributors.

current emissions, reaching a politically acceptable agreement is not easy. For example, questions may come up such as the period from when to consider historical emissions and whether or not emissions from land-use, land-use change and forestry (LULUCF) are to be included. These questions may very well result in another long political battle. Implementation of the global R&D fund thus presents a dilemma: the greater the amount of the fund needed, the less likely is participation of the major contributors.

Figure 3.1 Contributions to the UN regular budget based on the UN scale of assessments (2007)



As per the latest reports of IPCC, the total public funding for energy technologies in IEA countries had in fact declined soon after the initial interest created through the oil shock in the 1970s levelled off, despite the fact that the UNFCCC was ratified much later (IPCC 2007). The global R&D fund proposal intends to change this trend. At the domestic level, the idea of the global R&D fund may appeal to the energy sector in both developed and developing countries, since an increase in public R&D budgets can be expected. Similarly, the proposal may be of interest to industrial/energy ministries, as international agreements on R&D may strengthen their manoeuvrability in pursuit of such organisational objectives as the expansion of the bureaucratic turf and the increase in their organisational budget.

The global R&D proposal may however encounter resistance from finance ministries in donor countries. One solution to alleviate such concerns is to set a limit on the total financial obligations for each country, so that parties to the R&D protocol will know the maximum cost of participation before deciding to ratify (Barrett 2003). This may be one advantage as compared with the proposal for enabling financial contributions as part of mandatory commitments, where compliance costs are uncertain and agreements on deeper cut of GHG emissions can lead to further uncertainty.

It is important to encourage private investments in low-carbon technologies not only for technical (i.e. avoiding technology lock-in) but also political reasons (i.e. keeping the amount of public R&D fund at a reasonable size).

It is also critically important to encourage private investments in low-carbon technologies not only for technical (i.e. avoiding technology lock-in) but also political reasons (i.e. keeping the amount of public R&D fund at a reasonable size). It was recently pointed out that additional investment and financial flows needed to return global GHG emissions to current levels in 2030 would be USD 35-45 billion in energy research, development and deployment alone (Haites 2007).[10] In contrast, governments

10. "Additional" investment in a particular year means the difference between the necessary flows and a reference scenario in that year.

of the US and Japan, the two largest investors in energy R&D, spent USD 3.38 and 2.45 billion, respectively, between 1977 and 1999 (Sagar and van der Zwaan 2006). While it is necessary to increase the public R&D budget significantly, public money alone cannot meet the total investments needed. Therefore, further efforts to orient private investments for low-carbon technologies can minimise political overload of international cooperation for technology finance.

Arguments on political feasibility of proposals for improving financial mechanisms are summarised in Table 3.2.

Table 3.2 Political feasibility of proposals for improving financial mechanisms

Key Elements of Political Feasibility	Financial mechanism linked with mandatory requirements	Global R&D protocol
Self-enforceability	✓	✓✓✓
Side-payments	✓✓	✓
Domestic interests	✓✓	✓✓
Domestic institutions	✓	✓

Legend: ✓✓✓addressed in depth ✓✓addressed in some detail ✓addressed very little

3.5.2 Assessment of proposals for building synergies between UNFCCC and non-UNFCCC initiatives

The proposal to enable project and/or programme activities with significant technology components under non-UNFCCC initiatives eligible for preferential treatment under the CDM can provide non-Annex I countries with an additional opportunity for investments in low-carbon technologies. Asian countries with large domestic mitigation potential such as China, India, Indonesia and the Republic of Korea, who are also members in many non-UNFCCC technology initiatives, are most likely to benefit from this sort of mechanism. For example, China is a member of several non-UNFCCC initiatives, including the APP, the M2M Partnerships, the Carbon Sequestration Leadership Forum (CSLF) and the International Partnership for the Hydrogen Economy (IPHE). The greater flexibility in the Kyoto Mechanisms may help developed countries to fulfil their legally-binding commitments more easily. However, as noted before, incentives created by the Kyoto Mechanisms need to be supported by strong enforcement, which remains as a challenge.

Enabling project and/or programme activities with significant technology components under non-UNFCCC initiatives eligible for preferential treatment under the CDM can provide non-Annex I countries with an additional opportunity for investments in low-carbon technologies.

The proposal may also bring further opportunities for domestic industries in developing countries. As major host countries of CDM projects, China and India have large potential to attract additional technology investments. It is estimated that as much as 50% of CER from CDM projects are likely to come from China by 2012. Project developers in countries that did not ratify the Kyoto Protocol (e.g. US) could also expect better market access to their technologies, if synergies are built between UNFCCC and non-UNFCCC initiatives.

While sectoral approaches have a range of variations, the political feasibility is examined here for only two proposals: technology standards (Barrett 2003) and sectoral crediting mechanism (Schmidt et al. 2006). International technology standards may create a network externality by making it attractive for states to enforce such standards. For example, access to the markets of the major consuming countries provides a powerful market incentive for industries in developing countries to conform to the regulatory environment of importing countries. It is true that, as one participant in our consultations

pointed out, there are some important technologies (e.g. CO_2 capture and storage) to which such network effect would not be applicable. For such technologies, cost constraints may be more critical in determining market penetration than accessibility (Philibert 2004). With regard to tradable goods, however, there is substantial evidence of a "California effect", i.e. nations are increasingly adopting the standards of their richer, greener trading partners (Vogel 1995, Vogel 1997).

Improving energy efficiency is likely to appeal to the self-interest of many countries in Asia. There is nevertheless reluctance to link domestic energy efficiency measures to international commitments.

Improvement of energy efficiency is of self-interest to all countries, since it saves energy costs, and contributes to energy security and reduction in local air pollution. Indeed, many Asian countries, including China, India, the Philippines, Thailand and Viet Nam, have taken several domestic measures to conserve energy. However, there is nevertheless reluctance to link such domestic measures to international commitments. It was reported that a proposal to include a regional target of energy efficiency improvement in the Singapore Declaration of the East Asia summit encountered strong opposition from India (*Asashi Shinbun* 4 November 2007). Their view partly reflected a fear that such commitments on a regional basis may lead to national emissions control targets under a future international regime. A senior negotiator from India at our consultations pointed out that commitments based on energy intensity would not be acceptable as energy intensity depends upon both energy efficiencies of different sectors and sectoral shares of GDP. Extrapolation of current energy intensity levels into the future is considered inappropriate as the relative growth rates of different sectors in the future are uncertain for many developing countries. It was stressed that harmonisation of energy efficiency standards in developing countries with those of industrialised countries would not necessarily be advantageous to the former because of wide differences in natural resource endowments. To alleviate such concerns, some incentives must be provided. The sectoral crediting mechanism envisages two incentive mechanisms to reward or compensate the GHG mitigation efforts by developing countries. One is that those countries that reduce their sectoral GHG emissions below no-lose, pledged targets would be awarded emission reduction credits that could be sold to developed countries. On the other hand, failure to fulfil the pledged level would not incur any penalties. In addition to the crediting mechanism, the proposal suggests another incentive mechanism called "technology and finance package" to financially support the deployment of advanced technologies, pilot projects and capacity building.

A general pattern of domestic cost/benefit distribution in the sectoral approaches is that efficient companies might find sectoral approaches attractive while costs of compliance are imposed on less efficient ones at least in the short-term. In sectoral crediting mechanism, a decision on how to distribute emission credits and financial resources among stakeholders adds a political twist. To sell the idea of sectoral crediting mechanism to domestic industries, the government may need to devise an equitable distribution mechanism to strike a balance between rewards for efficient companies and compensation for companies bearing high compliance costs.

International technology standards may be appealing to some domestic actors in developing countries, as harmonisation of standards can lower the fixed costs of export goods. Harmonisation can save money by eliminating the need to develop separate equipment to adhere to different technology standards in various countries. National adoption of international standards can also reduce administrative costs of establishing domestic technology standards, as many implementing agencies in developing

countries already suffer from inadequate budgetary and human resources. In the case of automobile emission standards, for example, even those countries that do not export to the US have an incentive to adopt the same standards. This is partly because international technology standards presented an opportunity for policymakers in those countries lacking such resources to emulate (Faiz et al. 1996).

Domestic institutional arrangement and industrial structures may raise a concern over the political feasibility of the sectoral approaches, however. As previously mentioned, for example, the reality of how policies are implemented in China is almost entirely a local matter. In addition, despite some efforts by the central government to consolidate energy-intensive industries, competition among provinces, counties and cities to foster their own local champions and increase GDP, the capital stock, tax revenue and corporate profits has kept such industries' structures highly fragmented. Table 3.3 shows the fragmented nature of China's steel industry in terms of production, share and the number of firms. The top three firms contributed only 14% of national steel production in China as against 69% in Japan. Table 3.4 shows that there is an increasing evidence of fragmentation over time in several other industries, besides steel industry. Inter-province competition and highly fragmented structures of energy-intensive industries can be a burden for political efforts to set and implement common technology standards or intensity targets at sectoral level. One study argued that the poor performance of energy intensity improvement during the first year of the 11th Five Year Plan, which called for 20 percent reduction in energy intensity of GDP from 2005 to 2010, was largely due to local-interest-driven competition among provinces and cities (Rosen and Houser 2007).

The reality is that how policies are implemented in China is almost entirely a local matter.

Table 3.3 Global steel industry, market share and industrial concentration (2006)

Country	Production	Share	Top 3 firms*
	Crude, Mt	% of global	% of national
China	422	34.6	14.1
EU25	198	16.3	44.7
Japan	116	9.5	69.3
U.S.	99	8.1	59.7
Russia	71	5.8	55.1
South Korea	48	4.0	85.8
World	1,219	100	—

Source: Rosen and Houser 2007 Table 2, p. 13
Note: * Share of domestic production from the three largest companies in 2005.

Table 3.4 Industry concentration (number of firms in China)

Industry	2002*	2004	2006
Iron & steel	3,551	4,947	6,959
Nonferrous metals	1,332	1,766	2,798
Cement	4,656	5,042	5,210
Glass & glass product	1,739	2,205	2,982
Paper & pulp	2,606	3,009	3,388
Chemical material	12,481	15,172	20,083

Source: Rosen and Houser 2007 Table 3, p. 13.
Note: * 2002 number is from a February 2003 survey.

Arguments on political feasibility of proposals for building synergies between UNFCCC and non-UNFCCC initiatives are summarised in Table 3.5.

Table 3.5 Political feasibility of proposals for building synergies between UNFCCC and non-UNFCCC initiatives

Key Elements of Political Feasibility	Linking non-UNFCCC initiatives to the Kyoto Mechanisms	Sectoral approaches
Self-enforceability	✓	✓✓✓
Side-payments	✓✓	✓✓✓
Domestic interests	✓	✓✓
Domestic institutions	✓✓✓	✓

Legend: ✓✓✓addressed in depth ✓✓addressed in some detail ✓addressed very little

3.5.3 Assessment of proposals for enhancing the flexibility in Intellectual Property Rights (IPRs)

IPRs for low-carbon technologies was discussed prominently in IGES consultations, with participants from developing Asia seeking enhanced flexibility of IPRs.

The issue of IPRs for low-carbon technologies was discussed prominently in all IGES consultations, with participants from developing Asia seeking enhanced flexibility of IPRs. The joint ownership of IPRs through collaborative R&D may allow participating countries to share the costs of R&D and diversify risks associated with R&D. Joint R&D may also be seen as side-payments to those countries lacking technical, financial and human resources to develop the desired technologies on their own. However, self-enforceability of a joint R&D proposal is contingent upon whether the regulation and structure of the industry creates sufficient incentives to participate in and conduct joint research. India's experiences from IGCC showed that it was essential to provide economic incentives for the private sector to conduct research and deploy desired technologies through stricter regulations and pricing policies for carbon emissions (Ockwell et al. 2007). Furthermore, a joint cooperative R&D scheme for an industry with highly concentrated structure might decrease individual research incentives, thereby eliminating competition in technology development. Thus distinct decisions are necessary for making the collaborative R&D proposal more participation- and compliance-compatible.

Compulsory licensing of IPRs may be a unilateral action, but it is not automatically self-enforcing, since a country is not necessarily better off if it resorts to such measures. It is reported that aggressive use of compulsory licences as an instrument of technology transfer might eliminate prospects for effective technology transfer and discourage aggregate investments of foreign companies in the developing countries (Correa 2005). Furthermore, it was argued that 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 (Watson 2002). To avoid such negative consequences, policy-makers seeking compulsory licensing should consider the summation of social costs that may, in the end, outweigh short-term benefits of this action (Reichaman and Hasenzahl 2003).

Moreover, while advocates of compulsory licensing often draw an analogy with the case of HIV/AIDS vaccines, it should be noted that IPR protection generally plays a quite different role in the energy sector than it does in the pharmaceutical sector (Barton 2007a, Barton 2007b). In the pharmaceutical sector, an individual patent usually has a

substantial impact, since a specific drug may not have any substitutes. In contrast, in the energy sector, there is likely to be competition both within the general product area (e.g. wind turbines), and among different methods of producing electricity or fuel. For renewable energies such as photo-voltaic (PV), bio-mass and wind power, basic approaches to solving the specific technological problems have long been off-patent. Even for patented products, there is usually competition among different manufacturers, which brings royalties down. These conditions can reduce the thresholds to market entry, through methods other than resorting to compulsory licensing or buying-out. In the PV sector, for example, such possibility of entry was demonstrated by Tata-BP Solar, an Indian firm, based on a joint venture, and Suntech, a Chinese firm, based on a combination of its own technologies and purchase of developed world firms.

At the domestic level, however, compulsory licensing and buying-out approaches may be successful in deploying new technologies on a concessionary basis, as was demonstrated by the US Clean Air Act. The US Clean Air Act mandates the compulsory licensing of patented technologies needed to meet agreed standards. For example, in August 2006, a court in the US granted Toyota a compulsory license on three Paice patents for hybrid transmissions, for a royalty of USD 25 per automobile (Lee et al. 2007). On the other hand, the expertise and know-how, which are key factors of successful technology transfer, are unlikely to be associated with such a transfer. In addition, when a broad range of technology options is available, governments are likely to encounter difficulty in picking appropriate technologies especially due to the lack of information to negotiate a suitable price for royalties (Stern 2007). In this case, affected firms will lobby heavily, since they recognise the distributional implications of such measures. Concerns over who could get what may very well result in a serious political battle in the decision-making process.

In contrast to the compulsory licensing and buying-out approaches, the international collaborative R&D scheme may provide learning opportunities for participating companies, and access to technical and financial resources, especially to firms in developing countries. However, again, it is a matter of domestic institutional arrangements whether domestic companies can fully enjoy the fruit of international collaboration and deploy the desired technologies in developing countries. There are questions, for example, whether China's laws and regulations were adequate to cause the change in behaviours in the face of divisions of authority within China (Ohshita and Ortolano 2006, Cherni and Kentish 2007). Furthermore, weak domestic IPR protection in developing countries may deter domestic firms from participating in such international technology collaboration, as their domestic competitors may copy them without paying. It was reported that the risk of introducing clean coal technology in China would be very high since the acquired IPRs could not be effectively protected (Philibert and Podkanski 2005). The domestic institutional and administrative fragmentation needs to be addressed further.

IPRs may be only a partial barrier to technology transfer and diffusion; and the role of IPRs varies with industrial structures in question.

It must also be noted that IPR issues might be only a part of barriers to technology transfer and diffusion. The Stern Review pointed out that for key mitigation technologies, especially electricity generation, IPRs generally represented a much small component of cost due to the large scale of the capital investment and running costs (Stern 2007). A case study of an IGCC programme between India and the UK, furthermore, 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 with the low quality of Indian coal and the technology's lack of

a track record, and also that the economics did not favour IGCC over other technologies, unless there was an adequate restriction on CO_2 emission (Ockwell et al. 2007). IPR issues have not yet appear strongly even for CCS, as revealed from the work of task forces of the CSLF, in which China, India, Japan, and the Republic of Korea and 18 other countries participate. A study on the role of IPRs in access to renewable energy technologies in developing countries also showed that key barriers were not associated with IPRs and the role of IPRs varied along with industrial structures in question (Barton 2007a).

Arguments on political feasibility of proposals for enhancing the flexibility of IPRs are summarised in Table 3.6.

Table 3.6 Political feasibility of proposals for enhancing the flexibility in IPRs

Key Elements of Political Feasibility	Joint ownership of IPR through collaborative R&D	Buying-out and compulsory licensing
Self-enforceability	✓	✓
Side-payments	✓✓	✓
Domestic interests	✓	✓
Domestic institutions	✓	✓

Legend: ✓✓✓addressed in depth ✓✓addressed in some detail ✓addressed very little

3.6 The Way Forward

Each of the reviewed technology cooperation proposals has strengths and weaknesses in terms of the four elements of political feasibility – self-enforceability, the provision of side-payments, fit with domestic interests and institutional arrangements.

While the above consideration of political feasibility of technology cooperation proposals is preliminary and qualitative, it has some implications for discussions on the post-2012 climate regime. The assessment showed that each proposal has strengths and weaknesses in terms of the four elements of political feasibility – self-enforceability, the provision of side-payments, fit with domestic interests and domestic institutional arrangement. Proponents of each proposal need to consider such weaknesses and strengths.

The proposal of the global R&D has the advantage of being self-enforceable, but presents major donor countries with distributional or relative gains concerns at the international level. States care not only about their direct outcomes from cooperation but also how well they fare compared with others. Such concerns create zero-sum considerations that would impair international cooperation. One remedy is to offer side-payments such as preferential treatments of national companies of the major donor countries and a weighted voting system for the management of the fund. The former, however, might violate the principle of the World Trade Organisation. Another form of side-payments can be to link financial contributions with emissions reduction commitments, as proposed by the BASIC project (BASIC 2006). However, this form of side-payments is likely to erode environmental effectiveness, since financial contributions counted as emissions reduction commitments do not directly lead to net emissions reduction. Finally, it is also necessary to devise a mechanism to attract private funds for low-carbon technology finance. The creation of venture capital funds for nearly commercialised technologies, along with a global fund for basic R&D, may be one solution. The former is likely to find it easier to attract private investments, while the latter is basically financed by public money.

As for synergies between UNFCCC and non-UNFCCC initiatives, making project and/or programme activities with significant technology components under the UNFCCC eligible for preferential treatment under the CDM can take advantage of the existing domestic interests and institutional infrastructure in developing countries. Such synergies can be captured further by restructuring the CDM to specifically promote technology transfer. One proposal is 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 made eligible for CDM (IGES 2005, Stern 2007). By approving CDM activities on the basis of an index of approved technologies, this approach is expected to streamline the CDM procedures and simultaneously boost the transfer of specific technologies. However, expanding the CDM scope will require deeper emissions cuts by developed countries and an effective enforcement mechanism. The Kyoto Protocol has not adequately addressed this fundamental problem. One approach to this enforcement problem is to seek solution not at the international level, but rather at the domestic level. For example, the British government introduced to Parliament a Climate Change Bill, which set ambitious emissions reduction targets. If it is passed, such domestic legal foundations help to alleviate the enforcement problem of international climate regime.

Most of the policy proposals do not adequately address the issue of domestic institutional and administrative fragmentation. Therefore negotiators who are designing the architecture of international technology cooperation need to be more cognisant of sub-national interests.

The issue of enhancing flexibility of IPRs provides a more complex political configuration, and requires further consideration. The ideas of buying-out and compulsory licensing with respect to mitigation technologies have been set forth and supported by several stakeholders from Asian countries, including China and India. However, economic results are not certain, and even if such ideas were put into practice, they might lose political support in the long run. It is perhaps critically important to assess each technology in each developing country to examine 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 (Stern 2007, Barton 2007a, Barton 2007b). The Expert Group on Technology Transfer, which was mandated to give its advice to both SBSTA and SBI at the recently held COP13 in Bali, may look into this issue more thoroughly.

International technology standards and a sector-based crediting mechanism for carbon intensity improvement have some merits on criteria of self-enforceability, side-payments and fit with domestic interests. International technology standards for tradable goods can be self-enforcing—i.e. if the number of actors adopting certain technology standards were to tip the balance so that network effects cause others to adopt the technology. The proposals also could match the organisational interests of implementing agencies like industry and energy ministries. In addition, these mechanisms can be designed with a view to building synergies with a quantitative national emissions reduction target framework for Annex 1 countries. A better understanding of relevant technology benchmarking can contribute to the development of a technology-based and bottom-up approach for differentiating national emissions targets. However, an important caveat comes from the domestic-level consideration of political feasibility. Domestic institutional and administrative fragmentation are likely to pose constraints to effective implementation in some Asian countries.

Lack of sufficient consideration of domestic institutional issues is not unique to the proposal for the sectoral crediting mechanism. Rather, what was revealed is that most of the policy proposals do not adequately address the issue of domestic institutional and

administrative fragmentation. This may be largely due to the nature of the proposals selected. However, domestic foundations are key to the effectiveness of any international cooperation. Without them, international cooperation, however carefully crafted, will be ineffective. To make international technology cooperation participation- and compliance-compatible, it is necessary to overcome such institutional fragmentation.

One of the ways forward is that negotiators who are designing the architecture of international technology cooperation need to be more cognisant of sub-national interests. Especially in large countries like China and India, more direct involvement of local governments and industries in the policymaking process during the crafting of a technology-oriented agreement is desirable. It may be wise to establish a coalition with key domestic actors who have an interest in international technology cooperation. Such actors may be motivated by economic benefits or their expectation to utilise international agreements for their own organisational objectives. From a national policymaker's perspective, in parallel, it is important to institutionalise the efforts of consulting local level policymakers before undertaking an international agreement, and to provide incentives and disincentives to get greater compliance of the agreement once it is made.[11] A number of policy tools are available at the hands of national leaders, including adjustments of fiscal transfers, promotions and demotions, and national campaigns to pressure local officials into compliance.

In this regard, there have been some developments in China. In parallel with a National Climate Change Programme (NCCP) in June 2007, which included several specific quantitative targets of mitigation policies, the State Council issued a notification that sought local governments to implement tangible policies and measures to achieve the objectives of the NCCP. The State Council also pronounced the establishment of the National Leading Group on Climate Change, Energy Efficiency and Pollutants Emissions Reduction, led by Chinese Premier Wen Jiabao and consisting of top officials from 23 ministries and agencies. Such ideas and norms that originated within the Chinese leadership ranks would send a clear signal to local governments regarding the types of policies acceptable to leaders (Tanner 1995). The establishment of similar inter-agency bodies for tackling climate change issues headed by Prime Ministers or Presidents is now observed in other Asian developing countries including India, Pakistan and Viet Nam.

The domestic incentive and disincentive mechanisms will vary cross-nationally. Therefore, there is a need to study how such arrangements are implemented at the domestic level in different Asian countries.

The domestic incentive and disincentive mechanisms to facilitate the effectiveness of participation and compliance will vary cross-nationally to some extent. Therefore, there is a need to conduct empirical studies on how such arrangements are implemented at the domestic level in Asian countries. There is also a need for interdisciplinary research in Asia to look into issues such as how an effective technology-oriented agreement can be transformed into an environmentally effective technology transfer agreement. A better understanding of the political feasibility is an asset in the design of international technology agreements in the post-2012 climate regime.

11. Asian developing countries are by no means unique to the problem of domestic institutions. Other developing countries as well as developed countries also face similar problems, when they negotiate and comply with international commitments. For the case of the U.S. in international climate policy, for example, see Tamura (2006a).

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Chapter 4

Mainstreaming and Financing of Adaptation to Climate Change

Chapter 4

Mainstreaming and Financing of Adaptation to Climate Change

Ancha Srinivasan and Toshihiro Uchida

4.1 Introduction

This chapter builds on our earlier report (Srinivasan 2006), in which we examined the status of international discussions on adaptation to climate change and relevance of various proposals to strengthen the focus on adaptation in the design of the post-2012 climate regime. Based on that analysis, we reported that options for mainstreaming adaptation concerns into development planning and financing of adaptation deserve the highest attention by international climate negotiators and national policymakers in Asia. Here, we examine these issues in detail based on a series of meetings held in 2007.

In February 2007, we organised an expert consultation in Japan on the progress and challenges for mainstreaming adaptation concerns focusing on the two most climate-sensitive sectors in Asia – agriculture and water resources. In stakeholder consultations held in New Delhi (August 2007) and Beijing (September 2007), representatives from both developing and developed countries exchanged views on financing and mainstreaming of adaptation, especially in the context of post-2012 climate regime. In addition, a questionnaire (Appendix C) was posted on the web to ascertain views on priorities and challenges for adaptation.

4.1.1 Adaptation – a daunting challenge in Asia

Despite high vulnerability and low adaptive capacity of human populations and ecosystems in Asia, adaptation to climate change received limited attention in national environmental policy in Asia.

Our consultations from 2005 to 2007 confirmed that adaptation to climate change received limited attention in national environmental policy in Asia, despite high vulnerability and low adaptive capacity of human populations and ecosystems in Asia. Such low priority is partly due to the preoccupation of policymakers in the region with other priorities such as poverty alleviation, sanitation, education and equitable social development. Further, most donors and development agencies are still in the early stages of understanding ways to address adaptation.

For many countries in Asia, adaptation is not an option but a necessity. There is overwhelming evidence that the severity and frequency of weather-related disasters are impacting development in Asia and that climate change is projected to exacerbate such impacts. Further delay in action poses considerable risk in meeting the Millennium Development Goals (MDG) in the region. The Fourth Assessment Report of the IPCC published in 2007 emphasised that the projected impacts would be serious in several sectors in Asia, including agriculture, water, health, and coastal and marine ecosystems (Table 4.1). For instance, sea level rise is expected to threaten the Ganges/Brahmaputra delta and the Mekong delta and displace more than 1 million people in each delta by 2050. Such a large scale displacement of people is not a simple challenge to deal with, and most nations in the region have not yet considered such possibilities in development planning. Likewise, the potential adverse impacts of climate change on onset of monsoons and water flows in major rivers in next 20 to 30 years have not been considered by water resource planners. Recently, the Consultative Group on International Agricultural Research (CGIAR) cited new research that shows climate change could slash

wheat production by as much as 50% by 2050 - a decrease that could put as many as 200 million people at greater risk of hunger (CGIAR 2007). Indeed climate change poses an additional burden on food security and water availability, especially in areas where agriculture and water resources are already under stress due to adverse meteorological conditions and demand pressures from society. There are similar adverse impacts in other sectors such as energy (power generation capacity and consumption patterns), tourism, forestry (forest fires) and industry. Mainstreaming of adaptation concerns into sectoral planning is, therefore, an immediate priority for Asia.

CGIAR reported that climate change could slash wheat production by as much as 50% by 2050 - a decrease that could put as many as 200 million people at greater risk of hunger.

Table 4.1 Key projected impacts of climate change in Asia

Sector	Projected impacts
Agriculture/ Forestry	• Increased risk of hunger in South Asia due to 30% decline in cereal yields (266 million Asians may face hunger by 2080) • Increase in agricultural water demand by 6-10% or more for every 1°C rise in temperature • Decline in net productivity of grasslands and milk yield
Water	• Decline in water availability from ~1820 m^3/yr to ~1140 m^3/yr in India by 2050; May adversely affect >1 billion people. • Decline in annual flow of Mekong river by 16 to 24% by 2050 • Disappearance of Tibetan Plateau glaciers of <4km length with 3°C rise • Shrinkage of area of glaciers by 80% over Tibetan plateau from 500,000 km^2 in 1995 to 100,000 km^2 by the 2030s. • Deterioration of water quality due to salt water intrusion • Decline in fish larvae abundance in coastal waters
Health	• Exacerbation of Cholera in South Asia due to increase in water temperature • Increased endemic morbidity and mortality due to diarrhoea all over Asia due to floods and droughts • Increase in infectious diseases for livestock
Coastal/Marine ecosystems	• Loss of 2500 km^2 mangroves in Asia with 1 m sea level rise; • Flooding of Red (5000 km^2) & Mekong (15-20,000 km^2) River deltas • About 2.6-18.8 million people along the coasts of Southeast Asia may be at risk of flood by 2100 • Large scale inundation and recession of flat sandy beaches affecting tourism • Loss of ~30% of Asia's coral reefs in next 30 years

Source: IPCC 2007

At the international level too, adaptation received less attention than mitigation. In 2005, however, COP11 of the UNFCCC adopted a decision (Decision 2/CP11) to initiate a five-year programme of work of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on impacts, vulnerability and adaptation of climate change with two aims: (a) to assist all Parties, in particular developing countries, including the least developed countries (LDCs) and small island developing states (SIDS), to improve their understanding and assessment of impacts, vulnerability and adaptation, and (b) to make informed decisions on practical adaptation actions and measures to respond to climate change on a sound, scientific, technical and socio-economic basis, taking into account current and future climate change and variability (UNFCCC 2005). The programme was renamed the "Nairobi Work Programme on Impacts, Vulnerability and Adaptation (NWP)" in 2006. The NWP covers nine areas (Figure 4.1) but actions initiated under this programme have been limited to date in Asia.

Design and implementation of adaptation policies are more challenging than those of GHG mitigation for several reasons.

It should be noted that design and implementation of adaptation policies are more challenging than those of Greenhouse Gas (GHG) mitigation for several reasons. First, mitigation policies are largely similar and have precedents to follow in terms of improving energy efficiency, promoting renewable energy, transforming transportation modes and fuels, etc. However, adaptation policies are largely unique and site-specific, hence they require more local adjustments. Second, mitigation is relatively limited in focus involving mainly energy-related sectors. Adaptation, on the other hand,

Figure 4.1 Nine components of the Nairobi Work Programme

Adaptation has a much broader focus involving nearly all sectors of the economy, hence more sectoral integration and greater authority would be necessary for implementation of adaptation policies.

has a much broader focus involving nearly all sectors of the economy, hence more sectoral integration and greater authority would be necessary for implementation of adaptation policies. Third, the prospects for failure with adaptation policies are high as implementation of such policies involves several stakeholders and broad mandates, including national development planning and implementation. In contrast, prospects for the success of mitigation policies are high. Finally, since the entry into force of the UNFCCC in 1994, much progress in mitigation policies was evident in both developing and developed countries. On the other hand, due to limited attention to adaptation for a long time, progress in adaptation policy design and implementation was limited even in developed countries. It is worth noting, however, policies to address climate variability, not climate change, have been in place in many countries and can be a good foundation for policies on adaptation to climate change.

4.2 Mainstreaming Adaptation Concerns into Development Planning in Asia

The need for mainstreaming adaptation strategies into national development plans has been long recognised in the UNFCCC. Borrowing the UNFCCC Article 2 language, Ian Tellum of the Netherlands Climate Change Studies Assistance Programme defined "mainstreaming adaptation" as "the process of bringing adjustments in ecological, social or economic systems into the common current of thought in society in response to expected climate impacts, to ensure that food production is not threatened and to

enable economic development to proceed in a sustainable manner" (Tellum 2003). In simple terms, mainstreaming is understood as integrating adaptation policies and measures in ongoing development planning and sectoral decision making. However, such integration cannot be a one time event as adaptation is a dynamic and multi-dimensional process (Hay et al. 2004).

There are many benefits of mainstreaming adaptation concerns into development planning and assistance. Mainstreaming ensures that current projects are no longer at risk from climate change and do not contribute to aggravating the vulnerability of local communities. It also ensures that future projects are consciously aimed at reducing vulnerability and enhancing adaptive capacity towards a climate-resilient development. For example, a water management policy which integrates adaptation concerns would ideally ensure water rights to groups exposed to water scarcity during drought. Mainstreaming thus entails making more efficient and effective use of financial and human resources rather than designing, implementing and managing adaptation policy separately from ongoing activities, and it is aimed to ensure the long-term sustainability of investments as well as to reduce the sensitivity of development activities to both today's and tomorrow's climate (Klein 2002, Huq et al. 2003, Agrawala et al. 2005). Effective mainstreaming would avoid any mal-adaptations and ensure consistency between the needs of poverty eradication and adaptation to climate change.

Mainstreaming entails making more efficient and effective use of resources and is aimed to ensure the long-term sustainability. Effective mainstreaming would avoid any mal-adaptations and ensure consistency between the needs of poverty eradication and adaptation to climate change.

Since climate change has already evolved from merely an environmental issue to a developmental issue (especially because the adverse impacts of climate change can nullify the developmental progress), several policy researchers and development practitioners in Asia have argued for mainstreaming adaptation into development planning and sectoral decision making. The link between adaptation and development becomes particularly relevant in mainstreaming adaptation concerns into official development assistance (ODA).

4.2.1 Modalities for mainstreaming

Participating stakeholders discussed various entry points for mainstreaming adaptation concerns into development planning and suggested that policymakers could incorporate adaptation concerns and their linkages with development initially in national communications to the UNFCCC, national adaptation programmes of action (NAPAs), national adaptation policy frameworks, poverty reduction strategy papers (PRSPs), national environmental action plans (NEAPs), MDG achievement plans, national agricultural policy documents, national water policy documents, etc. However, mere incorporation of adaptation concerns into such documents is in itself inadequate. Effective mainstreaming cannot be complete until suitable strategies in light of current and future impacts of climate change in a given sector are designed and implemented on the ground. The development of a national strategy that duly considers (a) local and sub-national adaptation needs, (b) current developmental policies and programmes, (c) stakeholder concerns and (d) technological solutions based on local experiences could be the first step toward mainstreaming adaptation concerns into development planning.

Integration of adaptation concerns can be done at various levels (local, sub-national, national, regional and international) using different approaches. Top-down approaches for mainstreaming include, for example, expanded irrigation systems and development of

drought-resistant crop varieties, while bottom-up approaches may include community-based water harvesting or allocation systems decided at the local level. Likewise, mainstreaming can be done at the policy level (e.g. national land use systems and integrated water management policies that fully consider current and future impacts of climate change) or at the operational level (e.g. location and design of bridges, reservoirs and hydropower facilities). Both traditional and modern approaches can be employed for mainstreaming. In a traditional approach, if an area is likely to experience more intense rainfall events due to climate change, water managers may change the drainage systems by replacing old small pipes with bigger pipes. In a modern approach, however, a mainstreamed adaptation strategy includes measures that address the underlying sources of vulnerability to climate change, particularly at the local level.

Some participants stated that mainstreaming adaptation concerns at the community level should pay attention to four areas, namely assessment, planning, implementation, and dissemination. In terms of implementation, collaboration with local extension services was considered important. The need for community-based monitoring and evaluation, and the importance of participation and transparency in the process was also regarded as important.

4.2.2 Progress on mainstreaming in Asia

All national communications in Asia submitted to date mainly focus on GHG inventories and mitigation, with very limited attention to adaptation policies and measures.

All national communications in Asia submitted to date mainly focus on GHG inventories and mitigation, with very limited attention to adaptation policies and measures (Srinivasan 2006). The limited focus on adaptation in China's and India's initial national communications, for example, was attributed to limited availability of relevant data and limitations of models in assessing sectoral impacts at the sub-national level. Such low attention to adaptation due to limitation of data and methodological capability was not only in developing Asia but also in developed countries (Gagnon-Lebrun and Agrawala 2006). For example, in Japan's 314-page 4th national communication, only half a page was devoted to adaptation policies. Likewise, Singapore, which is a relatively well-developed nation in economic terms but one of the most vulnerable to impacts of sea level rise, mentioned adaptation concerns in only one line out of its 75-page national communication. In some Asian Least Developed Countries (LDCs) such as Bangladesh, however, NAPA process seems to have served as a catalyst in mainstreaming adaptation concerns at least in planning stages. Several Asian countries plan to expand the coverage on impacts and adaptation assessments in their second national communications to the UNFCCC.

Insofar as mainstreaming adaptation concerns into development assistance is concerned, the OECD development and environment ministers recently made a declaration to integrate adaptation into development cooperation both within OECD and its partner countries (OECD 2006). Development agencies such as the World Bank, Asian Development Bank (ADB) and bilateral cooperation agencies such as Japan International Cooperation Agency (JICA), Department for International Development (DFID), Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) and others have begun to mainstream adaptation in their operations but progress is far from adequate (Klein et al. 2007). For example, JICA's efforts in mainstreaming climate concerns in various sectors through its ODA included reviewing conventional assistance and listing past projects which had adaptation benefits but were not implemented as "adaptation projects." In

2003, ADB published a report on mainstreaming adaptation concerns in ADB operations (ADB 2003), but the extent to which ADB investments in the region were climate-proofed through such guidelines remains unclear. Based on a survey of 26 bilateral and 10 multilateral donor agencies, Gigli and Agrawala (2007) concluded that international donors made significant progress in recognizing the importance of climate risks in their development co-operation policies, but translating such concerns into operational practices remains a difficult challenge.

Assessment of the progress on mainstreaming adaptation concerns in agriculture and water sectors in developing Asia, as part of the expert consultation held in February 2007, showed that several national agricultural policy documents of Asian countries referred to the need for considering climate variability but did not consider the long-term climate change explicitly. Indeed, the 18-country dialogue on water and climate conducted in 2003 revealed that water managers showed little enthusiasm for factoring long-term climate predictions into their calculations (Water and Climate 2003). Similarly, an analysis of water policy frameworks of four Annex I (Canada, Finland, UK and USA) and four non-Annex I (Argentina, India, Mexico and Zimbabwe) countries in 2006 showed that most of the frameworks did not incorporate climate change adaptation explicitly, although policy frameworks of Annex I countries were considered to provide a strong foundation for adaptation planning while those of non-Annex I were considered less mature, with weaker institutions and less capacity to provide a basis for adaptation (Levina 2006, Levina and Adams 2006).

Several national agricultural policy documents of Asian countries referred to the need for considering climate variability but did not consider the long term climate change explicitly.

The assessment of progress on mainstreaming adaptation in agriculture and water sectors of Bangladesh, China, India and the Philippines confirmed that much more needs to be done to integrate adaptation concerns into sectoral development planning. In Bangladesh, efforts to integrate adaptation concerns into agricultural research were evident but not in extension (Huq et al. 2003). In the water resource sector, managers committed to incorporate adaptation into existing plans but it remains to be seen if such commitments would necessarily lead to implementation on the ground. In China, the impacts of climate change were well-studied and several water conservation measures were developed. However, future climate change impacts are not yet integrated into sectoral development plans in both sectors. Further, information on priorities for adaptation in different regions was lacking. It is encouraging to note, however, some cross-sectoral studies on adaptation in various sub-regions of China are being planned recently.

In India too, the national agricultural policy contained many references to measures such as enhancing drought and salinity resistance in crops to cope with droughts and sea level intrusion respectively, and water conservation measures such as rainwater harvesting. However, there was no explicit reference to climate change adaptation. Likewise, the national water policy, which was formulated in 1987 and revised in 2002, contained many references to water use efficiency and integrated watershed management. However, no explicit references to adaptation were available. Further, the legal provisions on water were dispersed across various acts and there was no explicit legal framework for water extraction rights or water trading (Sharma 2006, Sharma and McCornick 2006). An expert committee on climate change impacts was established in India in 2007, however, to identify necessary adaptation measures and provide guidelines for mainstreaming adaptation concerns in development planning in target areas. In addition, as part of the

second national communications, integrated inter-sectoral adaptation assessments are planned to be conducted in several climate hotspots.

In the Philippines, many water conservation and flood prevention efforts were taken at both the national and local levels. However, climate change was not the primary motive for such measures. A few measures considered historical climate but they are not necessarily suitable for coping with future impacts of climate change.

4.2.3 Barriers to mainstreaming

The establishment of a cohesive institutional framework for implementing adaptation strategies was considered a main challenge in many Asian countries.

Participants at our consultations and respondents to the questionnaire identified many barriers to mainstreaming adaptation concerns in Asia including information (communication and coordination) barriers, institutional barriers, stakeholder participation-related barriers and the lack of suitable incentives and resources. Some of the barriers, such as lack of clarity in adaptation policy guidance and lack of incentives and adequate resources, are applicable to the entire region. Others, such as inadequate institutional structures, are applicable to specific countries or sub-regions. Some Chinese participants, for example, listed barriers such as establishing effective partnerships with local agencies, designing acceptable approaches that are in line with China's sustainability goals and national development plans, applying participatory integrated approaches and developing acceptable monitoring and verification protocols for use within a Chinese context. In Indonesia too, the barriers related to institutions, incentives and instruments were considered significant in mainstreaming adaptation concerns in agriculture and forestry sectors (Herawati et al. 2006).

Among the various information-related barriers, the lack of awareness among sectoral policymakers about adverse economic implications of specific impacts of climate change at the local level was considered the biggest bottleneck. Nearly 43% of respondents to our questionnaire identified it as a significant barrier. The mismatch between the temporal and spatial scales of projections of climate change and information needs of various sectors was considered the second biggest barrier (25% respondents). Participants pointed out that very few climate models can predict rainfall patterns in many Asian ecosystems with certainty or on timescales relevant to decision-making. The dearth of policy-relevant climate information was especially severe in mountain ecosystems of South Asia, SIDS in the Pacific, and coastal ecosystems of Southeast Asia, which are among the most vulnerable to impacts of climate change.

Inadequate human and institutional capacities to integrate information on adaptation into sectoral planning, and weak coordination among agencies responsible for development planning were identified as the most important barriers.

Insofar as institutional barriers are concerned, inadequate human and institutional capacities to integrate information on adaptation into sectoral planning, and weak coordination among agencies responsible for development planning were identified as the most important barriers. In many Asian countries, the environment ministries, which are usually the focal points on climate change issues, have limited leverage over agriculture and water management agencies and their policies. The parallel evolution of policies in different sectors without a holistic view of the vulnerabilities and impacts also slowed progress in integrating adaptation concerns.

The over-reliance of both national planners and development assistance agencies on structural and technological options which are inflexible and often insensitive to the local contexts and are technologically and financially demanding was also considered a

major barrier. An assessment of adaptation priorities using an analytic hierarchy process (AHP) method in Heihe river basin of northwest China, for example, confirmed that the feasibility of adopting technical and engineering adaptation practices was relatively low due to difficulties in obtaining financial support. On the contrary, water conserving practices such as adjustments in cropping patters and cultivation methods were more feasible because of their relatively small capital requirements (Yin et al. 2008).

Inefficient regulatory frameworks, insufficient means to consider interests of local stakeholders, institutional fragmentation and resulting communication barriers, and the lack of policy coherence and consistency between adaptation and development goals are other major barriers. In Bangladesh, for example, the ADB-supported Sunderbans' restoration project was originally aimed at improving adaptive capacity of the region but some components of the project in fact led to an increased vulnerability of local populations (Aslam, H., personal communication).

The lack of suitable incentives for individuals and organisations to realise effective mainstreaming was considered especially serious in Asian LDCs, where many national meteorological services do not have adequate incentives and are not mandated to provide agriculture and water sectors with the full range of services they need. In LDCs and SIDS, the so called "mainstreaming fatigue" was considered a barrier as there was a lack of adequate recognition of challenges in mainstreaming.

Practical demonstrations on promising mainstreaming options, capacity strengthening and streamlining of financial mechanisms are crucial to make further progress.

4.2.4 Potential countermeasures

Participants suggested that practical demonstrations of promising mainstreaming options, capacity strengthening and streamlining financial mechanisms are crucial to make further progress. Some respondents to the questionnaire pointed out that discussions on mainstreaming were so far mainly confined to elaborating pure theoretical and conceptual approaches rather than practical demonstrations. The Kiribati National Adaptation programme supported by the World Bank (Bettencourt et al. 2005) could be a good model for mainstreaming adaptation concerns at the national level for several countries, especially SIDS, and other developing countries where administrative mechanisms are not complex (Exhibit 1). Likewise, the initiative of China's Ministry of Science and Technology to develop a national adaptation policy framework, which sets out roles and responsibilities for different levels of governments as well as the private sector in order to streamline responsibilities among different institutions, can be a good model to emulate in other countries. The preparation of a NAPA type document in all Asian countries may also help in determining adaptation priorities and suitable means to mainstream such concerns in development planning.

In many critical ecosystems in Asia, detailed vulnerability and adaptation assessments have not been completed due to data limitations. Building support for such assessments through strengthening institutional frameworks and human capacities was considered a first step to move forward. Participants suggested that information on the current and future impacts of climate change and associated adaptation measures (both content and manner of delivery) should be customised to fit local conditions and needs of the decision makers, and discussed in the developmental context rather than the environmental context (IDS 2006). Framing adaptation issues in the context of policy making, and raising awareness of local impacts and coping strategies were considered

Information on impacts and associated adaptation measures (both content and manner of delivery) should be customised to fit local conditions and needs of the decision makers.

the most important to support mainstreaming efforts at the national level by a significant number of respondents to the questionnaire (41% each).

Exhibit 1 Five steps in mainstreaming of adaptation into national development planning – A case study from Kiribati

Step 1: National consultations on vulnerability and adaptation including social assessment of perceived climate changes in priority sectors
Step 2: Prioritisation of hazards & adaptations at the local and island level
Step 3: Ranking adaptations (managerial, infrastructure & policy) A – Urgent adaptations which can be done by communities B – Urgent adaptations for which communities need assistance from the national government C – Adaptations that are less important/urgent D – Adaptations that are not yet needed
Step 4: Allocating responsibilities of B type actions to national agencies and assessing the changes necessary • Changes to national policies and strategies • Changes to laws and regulations or enforcement • Formal engineering and construction works • Informal engineering and construction works by households and communities • Extension and information to countries, provinces & communities
Step 5: Matching adaptation priorities with operational plans of different agencies

Source: Bettencourt et al. 2005

Generating easily accessible and timely climate risk information based on good interpretation and communicating the economic case for various adaptation options are crucial to achieve effective mainstreaming and climate-resilient development.

The importance of creating an effective knowledge management system, comprising case study databases, toolkits (e.g. Community-based Risk Screening Tool - Adaptation and Livelihoods (CRYSTAL)), socio-economic information and appropriate policy options, to raise awareness of the local impacts and coping strategies among politicians and high level policymakers at various levels was emphasised (Klein et al. 2007). Participants stressed the need for generating easily accessible and timely climate risk information based on good interpretation and for improving the relevance of scientific outputs to decision-making through improving (a) communications between scientists and policymakers and (b) information delivery methods. Nearly 56% of respondents to the questionnaire suggested that communicating the economic case for various adaptation options was the most important. Many participants stressed the need for capacity building and information sharing at all levels, particularly at the local community level. Indeed, the relative success of mainstreaming environmental concerns in Sri Lanka's Poverty Reduction Strategy Paper (PRSP), including those related to climate change, was attributed to effective involvement of informed communities in the implementation of the poverty reduction strategies (IDS 2006).

Some participants stressed that policy harmonisation, inter-agency collaboration, and stakeholder involvement are crucial to achieve effective mainstreaming and climate-resilient development. For effective communication and coordination, participants called for bridging information gaps between different stakeholders, linking the science community to the policy community and clarifying the roles of each agency in mainstreaming efforts. Participants stressed that both vertical links (central government ministries – provinces – districts and local institutions) and horizontal links (all relevant ministries besides the ministry of environment) should be promoted. Nearly 53% of respondents to the questionnaire suggested that fostering institutional linkages and coordination at the national level was the most important element for effective mainstreaming of adaptation concerns.

The need for improved coordination among sectoral data providers to enhance harmonisation and consistency of data was also suggested. In order to improve

technical capacity for mainstreaming in the region, a region-wide adaptation facility may be established by ADB or other regional organisations. In this connection, the role of research institutions is especially important in improving decision making (under uncertainty), particularly in sensitive sectors such as agriculture and water. Other suggestions to improve institutional aspects of mainstreaming include the following:

(a) Managing adaptation plans by a ministry or agency with a high level of leverage so that institutional linkages and coordination can be fostered
(b) Encouraging the private sector to mainstream adaptation concerns in various operations
(c) Ensuring a coherent approach to mainstreaming through regular and broader engagement of stakeholders at various levels
(d) Building "boundary institutions" which can help to bring information on implications of climate change for sectoral planning and decision making

National meteorological services in Asian countries should be strengthened and reoriented to provide policy-relevant information regarding adaptation.

In order to promote mainstreaming, participants suggested that national meteorological services in Asian countries should be strengthened and reoriented to provide policy-relevant information regarding adaptation and sustainable development. In addition, legal provisions to mainstream adaptation concerns into management choices could be promoted. For example, standard environmental impact assessments (EIA) often consider the impacts of the potential project on the environment. In the future, the EIA should include a section to discuss how current and future impacts of climate change can affect the sustainability of the project itself. At the national level, a high level committee to look into climate proofing of various domestic investments can also be a good way to mainstream climate change concerns into infrastructure planning.

Donor agencies could facilitate adaptation mainstreaming by screening their project portfolio for potential mal-adaptations, and by creating an effective enabling environment for mainstreaming through (a) development of operational guidelines, (b) provision of additional support for monitoring and evaluation of mainstreaming approaches, and (c) enhancing the technical skills for mainstreaming at sectoral level. A study based on DFID aid portfolio in Bangladesh found that vulnerability assessments at the local level are crucial to facilitate mainstreaming adaptation in ODA (Tanner et al. 2007). Among respondents to our questionnaire, nearly 41% noted that developed countries should take a lead in supporting mainstreaming efforts through both reorienting ODA and providing technical skills. Likewise, a significant number of respondents (38%) stressed the need for regional and international capacity building initiatives on mainstreaming.

The UNFCCC and other international organisations can play a catalytic role in exchange of experiences, and in facilitating the development of region-wide and sector-wide approaches for mainstreaming. A majority of participants to the questionnaire (59%) noted that the future climate regime discussions could help mainstreaming efforts by focusing on (a) guidance to development agencies to preferentially support mainstreaming, (b) guidance to policymakers on inter-agency coordination and mainstreaming at national level, and (c) capacity building on mainstreaming options in critical sectors.

The UNFCCC and other international organisations can play a catalytic role in exchange of experiences, and in facilitating the development of region-wide and sector-wide approaches for mainstreaming.

4.3 Adaptation Financing

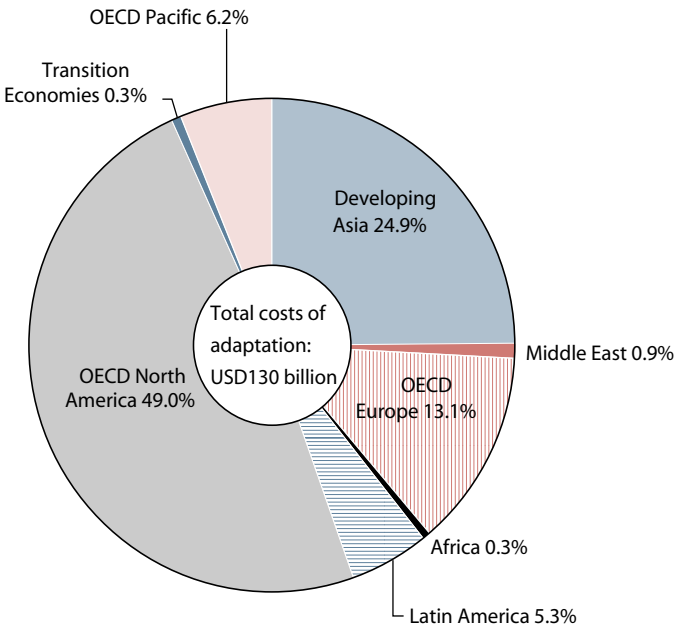
Widening the base of adaptation funds, capacity building for prioritisation of adaptation actions and research support for adaptation assessments were the three most important priorities.

Adaptation funding has become a major topic in international climate negotiations. The majority of respondents to our questionnaire confirmed that widening the base of adaptation funds, capacity building for prioritisation of adaptation actions and research support for adaptation assessments were the three most important priorities. Furthermore, it was repeatedly pointed out in our consultations that progress in discussions on mitigation targets would be nearly impossible without progress in other areas including adaptation. Finding appropriate means to fund adaptation efforts, therefore, is an important challenge for the global community to encourage effective participation of developing countries in the future climate regime. As climate change proceeds, the costs of impacts and the demand for adaptation funds by developing countries are bound to increase.

The costs of impacts of climate change are difficult to estimate, as there are both direct and hidden costs. Most often, hidden costs are rarely computed. The direct costs for example, include loss in crop production due to altered precipitation patterns; loss in forest production due to increased risks of forest fires; damage to infrastructure due to increased frequency and intensity of extreme events; evacuation costs due to storms, cyclones and landslides; heat-related hospitalisations; cost of upgrades to the drinking and wastewater infrastructures from sea level rise; drops in tourism revenue and industrial production, etc. Hidden costs may include the replacement value of infrastructure; costs of re-routing traffic, workdays and productivity lost; costs of provision of temporary shelter and supplies; potential relocation and retraining costs; costs on insurance, banking and investment; threats to national security, etc. Both direct and hidden costs often vary under different national circumstances, hence it is only possible to get very rough estimates.

The cost of climate change impacts was estimated at 5-20% of global GDP annually in the absence of adaptation (Stern 2006). The World Bank estimated that up to 10% of domestic and foreign direct investment (FDI) flows in developing countries, and up to 40% of ODA and concessionary finance might be at risk from climate-related damages (World Bank 2006). Therefore, cost-effective and timely adaptation strategies that are fully compatible with development objectives are crucial, otherwise communities and countries will be forced to implement reactive unplanned adaptations, which will prove much more costly. For example, infrastructure investments, which have long lifetimes of over 25 or 50 years, are particularly at risk if projected impacts of climate change are not taken into account in project design. The Stern Review estimated that additional costs of adapting infrastructure and buildings may amount to 1-10% of the total costs invested in construction in OECD countries, which could range anywhere from USD 15 to 150 billion annually (Stern 2006). Considering the fact that much of the infrastructure built to date did not consider impacts of climate change in its design, and that new infrastructure necessary to support development in Asia is enormous, the total costs "climate proofing" would obviously be large. The regional breakdown of projected adaptation costs in 2030 shows that a quarter of global costs of adaptation will fall on developing Asia (UNFCCC 2007, Figure 4.2).

Figure 4.2 Regional breakdown of projected adaptation costs in 2030



Source: UNFCCC 2007

Adaptation should not be seen merely as an additional cost as it may bring new economic opportunities including jobs and markets for innovative products (e.g. climate-proofing materials) and services (e.g. insurance options).

Adaptation, however, should not be seen merely as an additional cost as it may bring new jobs and markets for innovative products (e.g. climate-proofing materials) and services (e.g. insurance options). The IPCC (2007) reported several examples where the benefits of adaptation often exceed the costs by several orders of magnitude. For example, the benefits of adaptation to climate change in the Pearl River Delta in China were estimated to be as high as USD 5 billion while the costs were estimated to be about USD 400 million (Hay and Mimura 2005).

As discussed in our earlier report (Srinivasan 2006 p. 82-84), financing adaptation to climate change is an enormous challenge because of the significant gaps between the estimated costs and the limited funds available through the current climate regime. Table 4.2 summarises the costs of impacts and adaptation estimated by various agencies. It shows that the annual costs of adaptation run into several billions of dollars per year. On the other hand, Table 4.3 shows the limited availability of funds under four categories – Least Developed Countries Fund (LDC Fund), Special Climate Change Fund (SCCF), Special Priority on Adaptation (SPA) Fund of the Global Environmental Facility (GEF), and Adaptation Fund. Both the LDC fund and SCCF are based on voluntary contributions from a few developed countries. The LDC fund is mainly to support preparation of NAPAs and implementation of priority actions identified in NAPAs. Several LDCs in the Asia-Pacific region submitted NAPAs with estimated costs of implementing priority adaptation actions (Table 4.4). As of May 2007, six projects were approved under the SCCF adaptation programme with a grant of about USD 25.17 million and with expected co-financing of USD 92.67 million. The SPA approved 10 pilot and demonstration adaptation projects with core SPA funds of USD 25 million and co-financing of USD 62.81 million (Levina 2007). An additional USD 5 million was allocated under the SPA to support community-based adaptation projects in 10 countries including Bangladesh, Samoa and Viet Nam. It is important to note that SPA funds were meant to be fully allocated during the period from 2004 to 2007 but some funds remain unspent.

An additional USD 5 million was allocated under the SPA to support community-based adaptation projects in 10 countries including Bangladesh, Samoa and Viet Nam.

Table 4.2 (a) Estimates of costs of climate impacts

Estimates (US$ billion/year)	Remarks	Reference
160-330	Current global losses	UNFCCC (2007)
850-1,350	Global losses in 2030 (1.0-1.5% of world GDP)	UNFCCC (2007)
40	Costs in developing countries • 0.5% of developing country GDP • Could range a few billion to US$ 100 billion	World Bank (2006)
0.5-1.5% of world GDP	• Based on a 2 °C increase in global mean temperature • A 4 °C increase in global mean temperature could cause 1-6% loss of world GDP	Stern Review (2006)

Table 4.2 (b) Estimates of costs of adaptation

Estimates (US$ billion/year)	Remarks	Reference
>50	Total costs in developing countries • US$ 7.5 billion/year by scaling up NGO community-based initiatives • US$ 8-33 billion/year by scaling up urgent and immediate adaptation needs described in NAPAs • Other hidden costs (no estimates provided)	Oxfam International (2007)
49-171 28-67	Global costs in 2030 Costs in non-Annex I parties in 2030 • US$ 7 billion for agriculture, forestry and fisheries sector • US$ 9 billion for water supply sector • US$ 5 billion associated with human health • US$ 5 billion in coastal zones • US$ 2-41 billion related to infrastructure	UNFCCC (2007)
50-170	Additional investment in 2030	Smith (2007)
1.9-32.4	In developing Asia in 2030	UNFCCC (2007)
50-100		FT (2007)
100		Christian Aid (2007)
9-41	Total costs for "climate proofing" investments in developing countries • US$ 4-8 billion to climate-proof ODA and concessionary finance • US$ 2-3 billion to climate-proof FDI • US$ 3-30 billion to climate-proof Gross Domestic Investment	World Bank (2006)
15-150	Costs of making new infrastructure and building resilient to climate change in OECD	Stern Review (2006)

Table 4.3 Funds available for supporting adaptation efforts under the current climate regime as of April 2007

Name of the fund	Total funds mobilised (USD in million)	Unpaid contributions and pledges (USD in million)	Cumulative funds collected (USD in million)
1. Special Climate Change Fund (SCCF)	62.1	9.1	53.0
2. Least Developed Countries Fund (LDC Fund)	115.8	53.6	62.2
3. Strategic Priority on Adaptation* (SPA; from GEF Trust Funds)	50.0	-	50.0
4. Adaptation Fund (2% proceeds from CDM)	450 by 2012 (best estimate)		

* Co-financing for adaptation projects supported through SPA was USD 68.27 million.

Table 4.4 Costs of priority activities of adaptation, compiled from NAPAs of selected LDCs in Asia

Country	Adaptation measure	Cost (million USD)
Bangladesh	Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains	5.00
	Enhancing resilience of urban infrastructure and industries to impacts of climate change	2.00
	Promoting adaptation to coastal crop agriculture to combat increased salinity	6.50
	Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices	4.50
Bhutan	Landslide management and flood prevention	0.89
	Weather forecasting system to serve farmers and agriculture	0.42
	Flood protection of downstream industrial & agricultural area	0.45
	Rainwater harvesting	0.90
Cambodia	Rehabilitation of upper Mekong and provincial waterways to reduce risks caused by floods, improve fishery resources, supply sufficient water for irrigation and domestic uses	30.00
	Vegetation planning for flood and windstorm protection	4.00
	Development and improvement of community irrigation systems	45.00
	Community mangrove restoration and sustainable use of natural resources	1.00
Samoa	Reforestation, rehabilitation and community forestry fire prevention project	0.42
	Climate early warning system project to implement effective early warning systems and emergency response measures to climate and extreme events	4.50
	Implement coastal infrastructure management plans for highly vulnerable districts project	0.45
	Sustainable tourisms that take into account climate change and climate variability	0.25
Tuvalu	Increasing resilience of coastal areas and settlement to climate change	1.90
	Increasing subsistence pit-grown pulaka productivity through introduction of a salt-tolerant pulaka species	2.20
	Adaptation to frequent water shortages through increasing household water capacity, water collection accessories and water conservation techniques	2.70

Source: UNFCCC 2007

The decision to establish an independent Adaptation Fund Board – with members selected by and under the direct authority of the COP/MOP – may be significant for at least two reasons.

The Adaptation Fund, which is primarily through a 2% share of the proceeds on CDM transactions, has yet to become operational, although an agreement on management of the fund was reached at the COP/MOP3 held in Bali, Indonesia in December 2007. The decision to establish an independent Adaptation Fund Board – with members selected by and under the direct authority of the COP/MOP – may be significant for at least two reasons. First, developing countries would be given direct access to the Fund, without having to go through 'implementing agencies' such as the World Bank, UNDP, or UNEP. Second, the Adaptation Fund Board will be a new operating entity to be based at UNFCCC in Bonn, and it would be independent of the GEF. However, the GEF Secretariat would provide secretarial services while the World Bank would serve as a trustee during the first three years. The management of the fund will be reviewed every three years.

The lack of clarity on the scope of adaptation, the complexity of procedures to access available funds as well as the limited experience of countries in implementing cost-

It is now widely agreed that international climate regime alone cannot raise sufficient funds for adaptation and that other mechanisms outside the regime should be explored.

effective adaptation strategies pose additional challenges. It is now widely agreed, however, that international climate regime alone cannot raise sufficient funds for adaptation and that other mechanisms outside the regime, including bilateral and multilateral development assistance, insurance and risk transfer instruments, loans and grants by international financial institutions, should be explored while ensuring synergies with these mechanisms as much as possible.

The need to explore synergies between adaptation, disaster risk management and development was consistently discussed during our consultations, although some participants pointed out that putting too much emphasis on synergies might exclude more promising adaptation options. Many projects supported by ODA are considered to reduce vulnerability and enhance adaptive capacity. It should be noted, however, that most of such projects do not explicitly consider impacts of climate change in their design and implementation.

International financial institutions have begun to allocate additional funds for adaptation recently. For example, following directions from the G8 Gleneagles Process, the World Bank recently launched the Clean Energy Investment Framework (CEIF), with adaptation as one of its three pillars. The CEIF is expected to generate up to an additional USD 12 billion annually from the private sector and official agencies. Nearly 40 projects in 30 countries are in progress and it is expected that grant funding for adaptation projects would increase from USD 5 million in 2006-2007 to USD 60 million in 2008-2009. In addition, about USD 550 million is expected to be leveraged through International Bank for Reconstruction and Development (IBRD), International Development Association (IDA) and other funding (World Bank 2007). A new "Environmental Transformation Fund" to which nearly 800 million GBP was committed to date would also support adaptation efforts partly but the mechanisms for allocating this money are not yet designed (Radcliffe, D., personal communication). In Asia, ADB has also begun the Clean Energy Program under which it expects to support some adaptation initiatives.

A few other initiatives such as the Global Index Reinsurance Facility (GIRIF) of the International Finance Corporation, the Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank, and the International Strategy for Disaster Reduction Asia & Pacific (ISDR-AP) may also be utilised to fund adaptation efforts indirectly. It is important, therefore, to develop synergies between financial instruments available through the UNFCCC and the Kyoto protocol, and those available under non-UNFCCC mechanisms. Initiatives to proactively involve the business sector, especially the insurance sector, in adaptation at both the international and national levels are also necessary.

The mechanisms and allocation principles for adaptation financing should be fair, equitable, politically feasible, and have a potential to raise sufficient amount of funds that would meet adaptation needs of developing countries.

4.3.1 Burden sharing principles for adaptation financing

Burden sharing principles are the most important considerations in designing an adaptation financing mechanism. Our earlier assessment suggested that most of the proposals were based on historical responsibility or the "polluter pays principle" and the ability to pay. Stakeholders at our consultations stressed that the financing mechanisms and allocation principles (basic rules of financial obligations for adaptation) should be fair, equitable, politically feasible, and have the potential to raise sufficient amount of funds that would meet adaptation needs of developing countries. In our stakeholder consultations, we used the above criteria to assess four allocation principles: adaptation

beneficiaries pay principle, emitters pay principle, ability to pay principle, and climate-change winners pay principle (Farber 2007).

4.3.1.1 Adaptation beneficiaries pay principle

Under this principle, beneficiaries of adaptation policies and measures bear the costs. Indeed this is the basic rule that governs the trading of private goods. In daily life, an individual pays for goods because he/she is the beneficiary of the services that the goods provide. The principle is also justified in the case of public goods if they have natures usually attributed to private goods. Examples include public transportation, education, health services and parks, among others. Although adaptation projects have a public goods nature, the benefits of such projects typically accrue to local residents and therefore can be considered as having private benefits. This could form the basis of using beneficiaries pay principle as a burden sharing rule. However, the principle has serious problems from the point of equity, because the most vulnerable and poor sections of the communities in all nations and poor countries in the world suffer the most from impacts of climate change although they contribute the least to the problem.

Adaptation beneficiaries pay principle has serious problems from the point of equity, because the most vulnerable and poor sections of the communities in all nations and poor countries in the world suffer the most from impacts of climate change although they contribute the least to the problem.

In the context of burden sharing, equity can be assessed by historical responsibility and ability to pay (Oxfam International 2007). Table 4.5 lists per capita GDP in 2004 and per capita historical CO_2 emissions over a 12-year period following the adoption of the UNFCCC in 1992 for various countries in Asia. The table shows that most Asian countries are not historically responsible for climate change, as these countries typically have average per capita emissions of less than 1 ton, which are far less than the average emissions of developed countries such as the US, Japan, EU, or even the global average (4.18 tons). Therefore, under the beneficiaries pay principle, the burden tends to fall onto the countries that are not historically responsible for climate change. Similarly, in terms of ability, the developing countries with low per capita GDP in 2004 and are tend to bear a greater burden compared to their ability.

In international negotiations, developing countries repeatedly insisted that the costs of adaptation should be borne by developed countries based on historical responsibility and ability to pay. A large number of respondents to the IGES questionnaire also suggested that historical responsibility (determined on the basis of cumulative emissions) and ability to pay should be the basic principles for sharing of adaptation costs. In view of this, burden sharing rules strictly based on the beneficiaries pay principle are unlikely to be institutionalised in the post-2012 climate regime. Nonetheless, it is important to note that some developing countries, which are growing rapidly and contributing GHG emissions, are likely to be held responsible in future for bearing adaptation costs of the other developing countries such as LDCs and SIDS. In general, a more politically controversial task would be to divide countries into two groups, the countries that need to bear the costs of their adaptation and the countries to which other principles will be applied. In Asia, there are a few countries that already have sufficiently high incomes such as Japan, the Republic of Korea, and Singapore to finance their full adaptation costs. As economies grow, other Asian countries are expected to follow suit.

Table 4.5 CO_2 emissions and GDP of Asian countries in comparison to EU and US

Country	Average annual per capita CO_2 emissions (ton) over 1992-2003	Per capita GDP (2004, constant 2000 USD)
Bangladesh	0.19	416
Bhutan	0.64	970
Cambodia	0.04	363
China	2.61	1,323
India	0.87	546
Indonesia	1.25	904
Japan	9.42	38,088
Korea, Rep.	8.65	12,762
Lao PDR	1.39	393
Malaysia	4.43	4,296
Mongolia	3.29	464
Nepal	0.09	232
Pakistan	0.62	571
Papua New Guinea	0.43	620
Philippines	0.83	1,101
Singapore	12.45	24,938
Sri Lanka	0.44	960
Thailand	2.64	2,361
Viet Nam	0.53	503
EU (EU25)	8.48	19,621
United States	18.62	36,451

Sources: WRI 2007, World Bank 2007

4.3.1.2 Emitters pay principle

Under this principle, emitters pay the costs of adaptation in proportion to their current emissions or cumulative GHG emissions over a certain period. The emitters pay principle is essentially the same as the polluter pays principle (PPP), which is one of the internationally accepted rules in pollution control. In the context of climate change, "emitters" may include not only countries but also individual firms, industry groups and consumers.

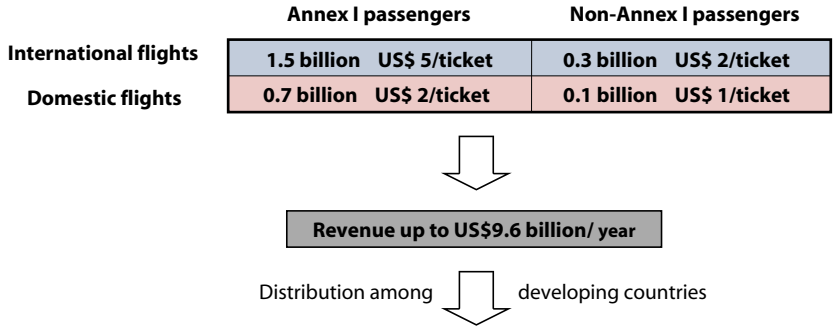
To illustrate the financial feasibility of this principle, the proposal on international aviation levy (Muller and Hepburn 2006) is considered, where emitters are defined as individual air travellers. As there were 800 million international air travels in 2006, the proposal could potentially raise USD 8 billion annually, assuming a ten dollar levy is imposed on each trip (Oxfam International 2007).

An improved version of aviation tax, in which all individual polluters are charged but the benefit is given to the most vulnerable, was proposed.

In our consultations, a participant from Bangladesh proposed an improved version of the aviation tax, in which all individual polluters are charged but the benefit is given to the most vulnerable. A major feature of this proposal is to differentiate the charges based on fairness considerations – whether passengers are from Annex I or non-Annex I countries, and whether they use international or domestic flights. Based on International Air Transport Association (IATA) passenger volumes, up to USD 9.6 billion per year can be earned through an aviation tax if passengers in Annex I countries pay

five dollars for international and two dollars for domestic flights, and if passengers in non-Annex I countries pay two dollars for international and one dollar for domestic flights. The amount is significant and is somewhat close to the lower estimate of the needs of adaptation in developing countries. Another feature of the proposal would involve allocating the collected tax to developing countries based on their responsibility (per capita emissions) and vulnerability (the needs of adaptation) (Figure 4.3). The proposal includes the creation of a special adaptation fund with 20% of total income to be allocated to highly vulnerable and extraordinarily vulnerable countries with high per capita emissions. The remaining 80% would be allocated to the other developing countries, which are classified into high-emitting, moderately-emitting, low-emitting, and least-emitting groups. Among these groups, countries with higher per capita emissions receive a smaller fraction of the revenue from the tax.

Figure 4.3 Adaptation levy from international aviation - A burden sharing proposal made by a participant at the consultation in Delhi



Group	Per capita CO_2 emission	Share of revenue	Examples of countries
High emitting	>3.78t	8%	Malaysia, South Africa
Moderately emitting	2.52t to 3.78t	12%	China, Thailand
Low emitting	1.89t to 2.52t	20%	Cuba, Egypt
Least emitting	<1.89t	40%	India, Indonesia
Special adaptation fund (20% of revenue)			
Highly vulnerable with unusually high emissions		6%	Palau, Nauru
Extraordinarily vulnerable with high emissions		8%	Barbados, Bahamas
Transaction costs for monitoring		6%	

Zhu et al. (2004) suggested that imposing a carbon tax of one USD per ton of CO_2 could raise up to USD 14 billion annually, even if the tax base is limited to Annex I countries for equity reasons. Nearly 40% of respondents to our questionnaire indicated their support for such an option becoming a legally binding commitment. A participant in our consultations suggested that the imposition of levy of 0.5 USD per barrel of oil consumed in all countries would generate as much as USD 5.5 billion annually, based on current production of about 11 billion barrels per year. TERI's adaptation financing proposal, which includes special compensatory financing (TERI 2005), International Climate Change Task Force proposal (ICCTF 2005), adaptation credits and vouchers (Schellnhuber and Cornell 2003) are also based on this principle.

As indicated above, the emitters pay principle has the potential to raise substantial funds while placing a relatively limited burden on individual emitters. In this sense, the principle has high political and economic feasibility. One critical issue with the emitters pay principle is whether "emitters" are defined as countries or individual emitters (such as

The emitters pay principle has the potential to raise substantial funds while placing a relatively limited burden on individual emitters.

firms or travellers). If it is on the basis of total emissions from countries, strong opposition may arise from countries with low per capita emissions. In this sense, it is more likely to be politically acceptable if emitters are defined as individuals. Researchers from Princeton University made a similar proposal at a COP 13 side event, in which individuals, not countries, become the basis for burden sharing in mitigation (de Coninck, personal communication).

4.3.1.3 Ability to pay principle

Under this principle, the burden for adaptation is shared in proportion to the ability to pay, which is typically measured in monetary terms such as GDP or individual income. However, other measures of ability to pay can be used, if appropriate. For example, Oxfam International (2007) used UNDP's Human Development Index (HDI) as a proxy for ability to pay and defined that countries should bear a financial burden only if the value of the HDI is above 0.9. The funds operated by GEF – SCCF, LDC Fund and SPA – may be considered to follow this principle partly, as most of these funds are based on voluntary contributions from developed countries with the ability to pay. However, it should be noted that these funds do not strictly incorporate this principle, as contributions are voluntary in nature. Currently, only 13 and 17 developed countries contribute to the SCCF and LDC funds respectively.

To assess the financial feasibility of this principle, the two-track approach for adaptation funding proposed by Bouwer and Aerts in 2006 was considered. Bower and Aerts recommended that a fixed percentage of GDP for Annex I countries could be utilised for raising adaptation funds. A tax of 0.03% on GDP (which is on average USD 8.6 per person) can raise up to USD 10.9 billion per year (Bouwer and Aerts 2006). The ability to pay principle can thus raise potentially large funds while placing a relatively small burden on individuals. Therefore, the ability to pay principle has high political and economic feasibility.

4.3.1.4 Climate change winners pay principle

Climate change winners pay principle implies that the burden of adaptation is shared on the basis of positive impacts of climate change.

Climate change winners pay principle implies that the burden of adaptation is shared on the basis of positive impacts of climate change. With moderate warming, for example, countries located at high latitudes such as Russia and much of Scandinavia are likely to benefit positively from climate change due to longer growing seasons and associated higher agricultural yields, lower energy consumption, and reduced mortality during the winter season, among others (IPCC 2007). Climate change winners are usually defined in terms of their geographic locations. However, as Farber (2007) noted, the climate change winners pay principle may not be feasible for the following reasons.

- It is difficult to raise sufficient funds, because only a few countries in high latitudes (e.g. Russia, Canada, and the Scandinavian countries) with relatively small populations are likely to be clear winners from climate change.
- Emissions and climate change benefits are not necessarily directly linked and therefore the principle is not equitable in terms of responsibility.
- The use of geographic location as a basis for taxation may meet strong political opposition from those countries affected by such a rule.

Given such weaknesses, we wish to propose an expansion of the definition as follows: *Climate change winners include any agents who gain from both intended and unintended impacts of climate change.* The burden is shared by all climate change winners according to the benefits they receive. For example, firms and individuals who earn profits from emissions trading, Joint Implementation (JI), CDM and other market mechanisms should be regarded as climate change winners. In this sense, the Adaptation Fund, whose main contributions come from the 2% levy of Certified Emission Reductions (CER) produced from CDM projects, can be regarded as having this principle as a burden sharing rule. The original Brazilian proposal on burden sharing approach (Filho and Miguez 1997), which recommended the use of up to 10% of the Clean Development Fund to finance adaptation, might be considered to use this principle.

Climate change winners include any agents who gain from both intended and unintended impacts of climate change.

To assess the financial feasibility of this principle, we consider the Adaptation Fund. UNFCCC (2006) estimated that by 2012, the total revenue under the fund would be in the range of USD 175 million – 1.05 billion, with the best estimate of USD 450 million. Therefore, a fair assessment might be that this principle can supplement other funding options. However, if such a levy is expanded to other market mechanisms such as JI and emissions trading, or if the levy is increased from the current 2% to 5%, the climate change winners pay principle has the potential to generate necessary funds for adaptation, and the private sector can more effectively be involved in sharing the burden of adaptation. The concept of differentiated levy for CDM projects in China (65% in HFC projects, 30% in N_2O projects and 2% for the rest) might be interpreted to be modelled along the lines of the "climate change winners pay principle".

In sum, given the need for raising substantial funds for adaptation, it is imperative to utilize all four principles singly or in combination depending on national circumstances. The beneficiaries pay principle is the fundamental principle that applies to developed countries. There are several proposals based on a combination of the "emitters pay" and "ability to pay" principles. These include the proposal on the creation of specialised funds (Tuvalu 2005), UNFCCC Impact Response Instrument (Muller 2002), and risk management schemes in which industrialised countries are mandated to contribute in proportion to their GHG emissions and GNP (Parry et al. 2005). The determination of an optimum combination of thresholds for both the "emitters pay principle" and "ability to pay principle" is likely to be controversial however. Oxfam International (2007) considered such thresholds by proposing a scheme in which all countries with the HDI above 0.9 (reflecting the principle of the ability to pay [capability]) are required to bear the costs for adaptation, if the average annual CO_2 emissions over a 12-year period since the adoption of UNFCCC in 1992 exceeds 2 tons (reflecting the emitters pay principle [historical responsibility]).

Given the need for raising substantial funds for adaptation, it is imperative to utilize all four principles singly or in combination depending on national circumstances.

The proposal on Greenhouse Development Rights (Baer et al. 2007) also suggests burden sharing to be determined on the basis of a responsibility capacity indicator. Others (Vattenfall 2006) proposed that countries with per capita incomes less than USD 11,000 should be exempted from mitigation targets and adaptation funds. The combined application of emitters pay principle and ability to pay principle can become more politically acceptable to large emitting countries in the region if a mechanism can be created in which emitters are defined as individuals.

Proceeds from carbon trading, corporate social responsibility (CSR) payments, and payments for ecosystem services were considered to be the most relevant options for involving the private sector in adaptation.

Respondents to our questionnaire suggested that mandatory contributions from Annex I countries (38%), a global carbon tax (22%) and an increased levy from CDM (19%) could be the most feasible financing approaches to raise the funds required to meet current and future adaptation needs. Nearly 60% of respondents noted that the vulnerability index of a nation and the vulnerability of communities should be considered the main criteria for sharing the adaptation funds among developing countries. About 85% of respondents to the questionnaire noted that the private sector should be more effectively involved in adaptation financing. Proceeds from carbon trading, corporate social responsibility payments, and payments for ecosystem services were considered to be the most relevant options for involving the private sector in adaptation.

4.3.2 Role of insurance in facilitating adaptation

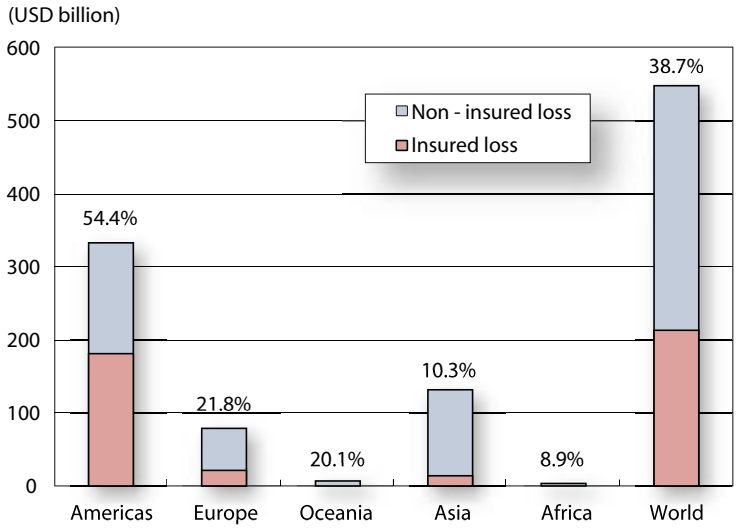
Participants at our consultations stressed that insurance should play a key role in facilitating adaptation in the post-2012 climate regime, as it can spread the risks from the adverse consequences of climate change and effectively reduce the vulnerability of local communities. The issue of whether public and/or private funds should be used for insurance received much attention. Some participants suggested that private insurance firms should play a greater role. However, other participants expressed doubts about the roles that the insurance sector can play, citing the public goods nature of adaptation. They stated that public resources should play a larger role in financing adaptation projects. ODA was proposed as a promising option, since significant synergies exist between adaptation activities and ODA-supported initiatives in many countries.

Nearly 56% of respondents to our questionnaire suggested that creation of an international insurance pool would be the most desirable approach.

The relative role of public and private sectors would obviously vary depending on the context. For example, in 2000 the Association of British Insurers implied withdrawal of flood insurance from locations at greatest risk and demanded an increased allocation of government expenditures for flood prevention plans (Association of British Insurers 2002). At the international level, an insurance-related public fund against climate damages was first proposed by the Alliance of Small Island States (AOSIS) in 1991. The AOSIS proposed the establishment of an international fund to compensate for damages that small-island and low-lying developing countries incur from sea level rise (Bals et al. 2005). Germanwatch (2005) expanded the AOSIS proposal to include climate damages other than sea level rise and to require developing countries to take disaster prevention measures to be eligible for compensation from the fund. Nearly 56% of respondents to our questionnaire suggested that creation of an international insurance pool would be the most desirable approach, followed by the expansion of micro-insurance to local communities (28%).

Despite considerable potential, climate-related insurance is very limited in developing Asia due to many barriers such as a lack of appropriate information on climate risks (Hoff et al. 2003, IPCC 2007). For example, the insured proportion of disaster losses between 2000 and 2006 was only 10.3% in Asia as compared with 54.4% in the Americas (Figure 4.4). In order to provide appropriate insurance services and determine the level of their premiums, it is crucial to have accurate information on climatic risks at the local level. In addition, the private sector insurers face a great challenge in making their services financially viable, as climate-related catastrophes result in very large losses once such events occur (for example, see Swiss Re 1998). This is particularly true in Asia, where large areas and populations are highly vulnerable to the impacts of climate change.

Figure 4.4 Insured proportion of disaster costs for 2000-06



Source: Dlugolecki 2007

In order to overcome the above barriers, an Asia-wide climate insurance scheme may be conceptualized and implemented with the support from regional development banks such as the ADB. First, the scheme should promote vulnerability assessment and future impact analyses in various climate hotspots in Asia, with a particular focus on the risks of catastrophic climate events. Data gathering, modelling and dissemination should be enhanced in cooperation with research institutions in the region. Second, the development of climate-related insurance instruments and services aimed at low-income households (e.g. weather derivatives, crop insurance and micro-insurance) should be enhanced, through both private-private and public-private partnerships. The role of the private insurance sector in industrialised countries such as Japan is especially important, as it has the requisite expertise and experiences. Third, to ensure the viability of private insurance services, a region-wide public fund may be established to compensate for catastrophic losses from climate change in low-income developing countries. The fund can be based on a mixture of voluntary contributions from industrialised countries and mandatory contributions from countries in the region in proportion to their ability to pay, and can be managed by a regional bank such as the ADB. The public fund can create an upper limit on compensation from private insurers when catastrophic climate events occur, and necessary compensation will be paid out from the fund. This will help private insurance firms to avoid incurring large losses due to catastrophic climate events and ensure viable business. The fund will also enable rapid payments to low-income households, who often need international assistance in the event of catastrophic climate events. The above scheme, therefore, will help protect the most vulnerable communities against climate shocks.

An Asia-wide climate insurance scheme may be implemented with the support from regional development banks such as the ADB.

The regional fund can be based on a mixture of voluntary contributions from industrialised countries and mandatory contributions from all Asian countries in proportion to their ability to pay, and can be managed by a regional bank such as the ADB.

The above scheme is in some respects similar to the international regime for compensation from oil pollution damage, and combines regional risk spreading and public-private partnership in the insurance industry. Under the 1992 Civil Liability Convention, every owner of a tanker carrying more than 2,000 tons of oil should purchase insurance to cover potential liability. The Convention also sets an upper limit on the liability of ship owners so that ship owners are exempt from prohibitively high payments. At the same time, the International Oil Pollution Compensation Fund 1992

(1992 Fund) provides rapid compensation to private agents (such as fishermen) and government agencies, if damages are not fully compensated. The 1992 Fund is financed by mandatory contributions collected from private companies, government authorities, state-owned companies or any other agents in a member state who receive more than 150,000 tons of crude oil and heavy fuel oil in one calendar year. In a nutshell, compulsory purchase of insurance by ship owners forms the basis of the compensation scheme. But it is supplemented by a public fund, so that the fund provides a channel through which victims of oil pollution can receive compensation in a timely manner. The public fund is financed by the agents who benefit from the transaction of oil.

4.4 The Way Forward

If Asia were to avoid costly, reactive and unplanned adaptations in the future, it is important for the region's policymakers to proactively mainstream adaptation concerns into development planning, and to mobilise adequate resources for "climate proofing" of all investments.

Utilising the various opportunities afforded by the international climate regime, several Asian countries have taken many innovative steps to implement the Clean Development Mechanism (CDM). On the other hand, no such comparable actions are evident in adaptation. Furthermore, several Asian countries are characterised by systemic vulnerabilities of very high magnitude. If Asia were to avoid costly, reactive and unplanned adaptations in the future, it is important for the region's policymakers to proactively mainstream adaptation concerns into development planning, and to mobilise adequate resources for "climate proofing" investments. It is important to note that investments, which appear to be cost-effective under current climatic conditions, may become economically and ecologically unsustainable in the future when adverse impacts of climate change become more evident. As many countries in the region are experiencing rapid economic growth, and many plans for building new infrastructure are in preparation, now is the time to act to avoid the risk of mal-adaptation. A few recommendations for achieving such goals are given below.

(a) *Creation of incentive schemes for mainstreaming adaptation*

Appropriate incentive schemes should be developed at national, regional and international levels to systematically operationalize mainstreaming adaptation concerns into development planning.

Appropriate incentive schemes should be developed at national, regional and international levels to systematically operationalise mainstreaming adaptation concerns into development planning. Throughout our consultations, participating stakeholders stressed that national strategies so far failed to recognise that a greater degree of local resilience is needed to cope with adverse impacts of climate change. Therefore, Asian policymakers should ensure that the responses to projected impacts are integral to policymaking priorities at all levels and in all sectors. In the Germanwatch proposal for climate-related international insurance fund (2005), eligibility for compensation is tied to disaster reduction efforts at the national level. Similar conditional schemes should be created to promote mainstreaming adaptation concerns into national planning. One possibility is to mandate all developing countries in the region to design national adaptation policy frameworks, along the lines of NAPA initially. In elaborating such frameworks, steps should be taken to ensure that all developmental policies including national budgeting processes in different sectors, bilateral and multilateral development assistance and private sector investments, undergo an adaptation check to determine if they directly or indirectly facilitate or constrain adaptation to current and future impacts of climate change, and to assess if they incorporate measures for adaptation to climate-related impacts. New policies should also incorporate adaptation aspects. The countries that demonstrate proactive efforts to mainstream adaptation concerns should be given preferential access to adaptation fund and other incentives such as reduced national premiums for regional catastrophe insurance facilities.

Currently, many national policies and measures pose barriers to facilitate adaptation to climate change. For example, even though forests are known to be several times more valuable as flood defences than for logging in floodplains, indiscriminate deforestation is still practiced in many Asian countries as a source of short-term income. Such policies obviously have adverse impacts on future adaptive capacity of ecosystems in a changed climate. Likewise, disaster risk reduction measures that do not account for climate change can lead to mal-adaptation. In Bangladesh, poorly maintained flood defences, which were designed for a certain level of floods, became counterproductive by trapping floodwaters and prolonging floods in 1999.

Regional and international efforts should be directed to develop guidelines for mainstreaming adaptation concerns in different sectors, and identify quantitative or semi-quantitative indicators for measuring the effectiveness of mainstreaming efforts at various levels (mainstreaming metrics). Further, it is important to promote regional cooperation in issues such as the development of early warning and seasonal climate forecasting systems, trans-boundary river basin management, and disease surveillance and monitoring systems through the strengthening of regional networks.

All developmental policies including national budgeting processes in different sectors, bilateral and multilateral development assistance and private sector investments, should undergo an adaptation check.

(b) *Mobilisation of "new and additional" financial resources for adaptation*
A growing body of evidence suggests that future impacts of climate change would be serious and adaptation needs would be substantial in Asia. Although additional research on adaptation needs and costs in specific locations is necessary, an urgent multi-pronged integrated regional strategy for adaptation is crucial by linking and scaling up several parallel processes in the fields of disaster management and development. New and additional financial resources for adaptation should be mobilised through (a) establishing a region-wide adaptation facility (b) promoting both North-South and South-South public investments, and (c) increasing the private sector's involvement in adaptation.

In GHG mitigation, and especially in the CDM, Asia overtook other regions such as Central and South America, which initially had more projects. The increase in projects in Asia has been made possible by concerted national and regional efforts including the establishment of a CDM facility at the ADB. Considering that adaptation is going to be a serious challenge, it is time to establish a region-wide adaptation facility, perhaps again at the ADB, with voluntary contributions from developed countries, mandatory contributions of a certain proportion of proceeds from CDM projects brokered by CDM facility at the ADB, and other voluntary contributions from Asian developing countries. This facility can be used to initially support mainstreaming efforts of all Asian countries, besides funding high priority adaptation actions identified by member countries.

The discussion of burden-sharing principles clearly showed that the adaptation challenge cannot be addressed without strong international collaboration. The long-term goal should be to establish a self-sustaining financing mechanism for adaptation in each community, nation and region. However, initial efforts should be directed towards enhanced North-South cooperation. Developed countries should focus on getting greater value for resources invested in developing countries, through appropriate "climate-proofing" of infrastructure investments. In addition, regional and international financial institutions should play a proactive role in raising funds to address trans-boundary impacts such as those from glacier melting.

The long-term goal should be to establish a self-sustaining financing mechanism for adaptation in each community, nation and region.

At the local level, development of flexible, customised credit schemes, and provision of alternative climate-insensitive income generating opportunities are the most urgent priorities.

At the local level, development of flexible, customised credit schemes, and the provision of alternative climate-insensitive income generating opportunities are most urgent priorities. The increased availability of credit including microfinance (through the Grameen and Proshika schemes) was identified as one of the contributing factors to Bangladesh's increased resilience to flooding over the past decade (ODI 2005). Microfinance can reduce risk to climatic impacts by allowing households to spread income-generating activities throughout the year and to invest in portable assets. Based on successful experiences in countries like Bangladesh, microfinance and microinsurance institutions are gradually becoming common in other Asian countries (e.g. BASIX in India). There is also a considerable potential for instruments such as weather derivatives, weather hedges and catastrophe bonds. A public-private approach facilitated by venture capital funds is likely to succeed in promoting the widespread use of such instruments. Local NGOs have also important roles to play in bringing these products to those who are in need, especially in the rural regions where the penetration of the market is still limited.

(c) *Establishment of a comprehensive region-wide risk-sharing and insurance scheme*
In June 2007, the Caribbean Catastrophe Risk Insurance Facility started its operations to provide client governments with immediate liquidity if hit by an adverse natural event such as a hurricane. Along similar lines, an *Asian Catastrophe Risk Insurance Facility* should be established with a view to (1) create a viable business environment for the private insurance sector, (2) provide rapid monetary assistance after catastrophic climate-related events, and (3) enhance proactive adaptation. Contributions to the Facility should come mainly from the private sector because preventing future disasters will help establish a stable business environment for private firms. A levy on foreign direct investment can also be a possible source of funding. As noted earlier, the levy can be discounted if there was evidence of mainstreaming adaptation concerns into development planning.

Rapid progress in the above three areas is only possible through a more effective regional cooperation in Asia. For such cooperation to be operational, efforts to promote policy convergence, institutional transparency, stakeholder participation and prioritisation of adaptation actions based on political consensus and scientific basis are vital.

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Chapter 5

Recognising and Rewarding Co-benefits in the Post-2012 Climate Regime: Implications for Developing Asia

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Recognising and Rewarding Co-benefits in the Post-2012 Climate Regime: Implications for Developing Asia*

Eric Zusman

5.1 Introduction

For the past three years, IGES has convened a series of multi-stakeholder consultations on the post-2012 climate change regime with a view toward better understanding Asian aspirations for the future regime and reconciling competing visions over the regime's post-2012 architecture. The consultations produced several noteworthy messages, but none appears more likely to shape impending negotiations than developing Asia's frequently reiterated opposition to binding emission targets on the grounds that hard targets will divert resources from poverty alleviation, energy security, and other development priorities (Pan 2004, Srivastava 2006).[1]

By enabling developing countries to secure developmental benefits as they mitigate greenhouse gases, bottom-up proposals have the potential to countenance concerns over post-2012 targets and timetables.

Given developing Asia's growing contribution to global warming, this opposition might lead some to view the prospects of crafting an effective post-2012 regime with pessimism. This chapter will view these prospects differently. Rather than assuming that the mitigation of greenhouse gases (GHG) is incompatible with sustainable development, the chapter focuses on a series of bottom-up proposals that generate what are aptly termed co-benefits (Byrne et al. 1998, Davidson et al. 2001, Munasinghe 2001). By enabling developing countries to secure developmental benefits as they mitigate GHG, these proposals have the potential to countenance concerns over post-2012 targets and timetables and thereby narrow divergent perspectives on a new climate framework (Baumert 1999).

Yet, as will be demonstrated in the chapter, this potential comes with conditions; it turns on how bottom-up proposals operationalise the recognition and rewarding of co-benefits (Halsnæs and Shukla 2007). In particular, this chapter will argue that researchers, policymakers, and climate negotiators would be well advised to consider the following:

- Researchers - standardising "rapid analytical methods" to evaluate the sustainable development contribution of pledged policies (to be verified by an international body with more rigorous primary valuation tools);
- Policymakers - conducting an assessment that prioritises integrated policies that stand to benefit the most from a regime-related tax on pledged policies;
- Climate negotiators - gradually scaling-up institutional reforms with a view toward minimising monitoring and enforcement costs.

For reasons that will soon become apparent, developing Asia is particularly well suited for piloting these recommendations.

* The author would like to extend his gratitude to Shuzo Nishioka for reading and commenting on earlier drafts of the chapter.

1. For instance, one of our participants, suggesting that developing countries should not be burdened with emissions targets, noted that "the Berlin Mandate, *which has not been rescinded*, provides only for Annex I parties to take up legally binding GHG abatement commitments." This position is also defended on the grounds that the developing world is not historically responsible for much of the world's current emissions and continues to have significantly lower per capita emissions.

This chapter begins by explaining why co-benefits could help reconcile tensions over the post-Kyoto architecture. It then explores the reasons that the current regime and its Clean Development Mechanism (CDM) have thus far failed to capitalise on this opportunity. It follows with an examination of the strengths and weaknesses of post-2012 proposals that nominally address these shortcomings. It concludes by relating results of an IGES questionnaire on co-benefits in the post-2012 regime to the above suggestions for moving forward.

5.2 Developing Asia and the Post-2012 Climate Change Regime

Developing Asia is home to nearly half the world's population, two of the world's fastest growing economies (China and India), and emission sources that account for approximately 27% of the world's GHG (IEA 2007). At the same time, much of developing Asia lives on less than two dollars per day (620 million people), lacks access to affordable electricity (most evident in South and Southeast Asia), and struggles to attain the Millennium Development Goals (MDGs) (Table 5.1). Thus, while developing Asia's contribution to global warming makes its participation in the post-2012 climate regime imperative, the region's economic deprivation makes defining the nature of that participation challenging (IGES 2006).

While developing Asia's contribution to global warming makes its participation in the post-2012 climate regime imperative, the region's economic deprivation makes defining the nature of that participation challenging.

Table 5.1 Percentage of the population living on less than one or two dollars a day in select Asian countries

	Percentage living on less than $1/ day	Percentage living on less than $2/ day	Year data reported
Bangladesh	10	38	2000
Cambodia	27	54	2004
China	10	35	2004
India	34	80	2004
Indonesia	1	16	2002
Malaysia	0	4	1995
Nepal	5	27	2004
Pakistan	3	26	2002
Philippines	3	16	2003
Sri Lanka	1	12	2002

Source: World Bank 2007.

Other considerations factor substantially into this challenge. These include the long held impression that developing Asia's lack of input into the current climate regime has resulted in a framework that does not adequately reflect regional interests.[2] They extend further to the frequently heard criticism that the regime's reliance on emission targets and timetables overlooks linkages between GHG mitigation and developmental concerns that are of greater importance to developing Asia's policymakers (Kok and de Coninck 2004, European Environment Agency 2004, IGES 2006). The neglect of these linkages would be more discouraging if not for a third set of factors that may help transform the above challenges into opportunities.

In developing Asia, policymakers have adopted numerous policies and measures that are simultaneously good for the climate and development. These efforts range from

In developing Asia, policymakers have adopted numerous policies and measures that are simultaneously good for the climate and development.

2. Based on a questionnaire and personal interviews with policymakers in Asia in 2005 and 2006, IGES found that Asian countries, in general, failed to convey their national developmental concerns during international climate discussions. This failure may be attributable to various factors, such as rapid turnover of climate change staff, limited capacity to understand the implications of climate change on sustainable development, and diversion of attention to more immediate national development priorities.

ambitious energy intensity targets and renewable energy standards (China, India, Thailand, Philippines) to sustainable transportation initiatives and fuel efficiency standards (China, India, Indonesia, Philippines) to community-based forestry management and avoided deforestation programmes (Cambodia, India, Indonesia, Lao PDR, Nepal, Pakistan, Philippines, Thailand). While the intent and scope of these efforts varies greatly, in an important respect they share much in common: they can *potentially* generate co-benefits. (See Table 5.2 for a list of co-benefits in different sectors; and Table 5.3 for a list of selected policies and measures that are likely to generate co-benefits in Asia).[3]

Table 5.2 Examples of typical co-benefits in various sectors

Sectors	Co-benefits
Forestry Management/ Avoided Deforestation/ Agriculture	• National/ local air quality improvement • Land conservation and preservation • Rural development • Employment generation • Flood control/ soil erosion control • Preservation of ecosystem services • Reduced non-point water pollution
Energy	• National/ local air quality improvement • Energy security (affordability/ accessibility/ availability) • Technology transfer • Employment generation
Transportation	• National/ local air quality improvement • Energy security (affordability/ accessibility/ availability) • Congestion reduction • Neighbourhood separation from traffic • Noise pollution reduction • Technology transfer • Employment generation
Waste Management	• National/ local air quality improvement • Employment generation • Energy savings (reduced production and material costs) • Land beautification/ reduced open dumping • Reduction in waste disposal/ collection costs

5.3 Reconciling Competing Preferences over the Post-2012 Regime: Co-Benefits

Much of the attention is attributable to the growing awareness that developmental co-benefits could help reconcile a fundamental tension over the future regime's architecture.

Co-benefits, defined as the additional and locally desirable developmental benefits of climate actions (or the GHG mitigation benefits of development actions), have received considerable attention in Asia. Some of the attention is traceable to disputes over the term's definition;[4] as suggested above and indicated in Box 5.1, co-benefits have been treated variously as the climate benefits of developmental actions and the developmental benefits of climate actions (Hiraishi 2007, Ellis 2007).[5] Much of the attention, however, is attributable to the growing awareness that developmental co-benefits could help reconcile a fundamental tension over the future regime's architecture. At the risk of oversimplification, this tension stems from a desire to extend emission targets and timetables to developing Asia and the countervailing concern that doing so would constrain the region's development.[6]

3. There is growing support for the kind of integrated planning that generates co-benefits outside Asia. Examples include the marketing of ethanol in Brazil; the promotion of agro-forestry in Senegal; the construction of hydropower projects in South Africa.
4. See Castillo et al. 2007 for a useful discussion of different definitions of co-benefits.
5. Ellis 2007, discussing the co-benefits of CDM projects, perceptively notes that co-benefits can be direct and indirect; be felt at the company-specific, local, and national level; and be enjoyed by project developers and/or local communities and/or multiple levels of government. In this paper, I am primarily interested in developmental co-benefits—the developmental benefits of climate actions.
6. This is an admittedly overly simplified version of competing preferences. Participants in our consultations framed the competing preferences as a strategic game wherein industrialized countries are trying to pass on an economic burden, to gain a competitive advantage in the energy sector and minimise transfers of technologies; and developing countries attempt to avoid a process that leads to uncompensated GHG constraints, prefers per capita limits (with an emphasis on equity), seek to realise a competitive advantage in CDM, and to acquire resources needed for adaptation.

Table 5.3 Selected policies and measures (PAMs) with *potential* to generate co-benefits in various Asian countries

Country/ PAMs	Year	Brief Summary of Contents
China		
Renewable Energy Law	2006	Aims to increase use of renewable energy, employing a variety of financial and regulatory incentives
Energy Conservation Law	1998	Aims to promote energy conservation and efficiency
The 11th Five Year Plan (Energy related targets)	2006	Aims to improve energy efficiency by 20% between 2005-2010; and ensure 10% of electric power capacity comes from renewable energy by 2010
Cleaner Production Promotion Law	2002	Encourages cleaner production research and development, technologies, and processes
Air Pollution Control Law	2000	Requires shutting down of mines with high sulphur coal; phasing out of inefficient industrial equipment; creating total emission control standards
Fuel Economy Standards	2004	Sets in place EURO IV standards by 2010 (Beijing started to phase in EURO IV standards in 2008)
India		
The Prevention and Control of Air Pollution Act	1988	Empowers central board to set ambient air standards; central and state boards enforce the standards
The Motor Vehicle Act	1988	Sets rules, standards and procedures concerning the regulation of motor vehicles and their use
Fuel Efficiency Standards	2007	Sets standards by 2010 (major cities to achieve those targets prior to 2010)
Energy Efficiency Act	2001	Establishes institutional arrangements and a regulatory mechanism to promote energy efficiency
Renewable Energy Targets	2004	Aims to provide 10% of new electric power capacity from renewables by 2012
The Electricity Act	2003	Liberalises operation and maintenance of power generating stations to increase rural access to power
The Forest Conservation Act	1988/ 1990s	Forbids the use or degradation of forest land for any 'non-forest-purposes,' or the clearing of forest land for any purpose other than reforestation (violations punishable by imprisonment)
Forest Policy [Joint Forest Management (1990s)]	1988/ 1990s	Recognised rights of forest dwellers; includes provisions to strengthen popular involvement in conservation and biodiversity preservation
Indonesia		
Electricity Bill (Law no. 20/2002)	2002-2004	Privatised electricity sector; defines social and environmental responsibilities of power producers, such as requiring percentages of renewable energy used and provided to the poor
Blue Sky Program (Program Langit Biru)	1992	Designed to improve urban air quality through expansion of public transport and levies; includes incentives for stationery source abatement
Basic Forest Law (Ministerial Decree SK 31)	2001	Allows communities to set up cooperatives and secure 25-year leases to forests (subject to government approval of the forest's local management plans)
Pakistan		
National Conservation Strategy	1992	Intends to conserve natural resources, sustainable development and improved efficiency in the use and management of resources, covering 14 priority areas (including energy efficiency and renewables)
National Clean Air Act	2005	Aims to control vehicular emissions, pollution from industry and indoor air pollution in rural areas
National Forest Policy	2001/ 2004	Installs new participatory processes and empowers local forest management institutions
Philippines		
Philippines Strategy for Sustainable Development (PSSD)	1989	Integrates environmental considerations into economic decision-making and promotes ten additional sustainable development goals
Clean Air Act	1999	Relies heavily on the polluter pays principle and other market-based instruments to curb air pollution
Renewable Energy Targets	2004	Aims to double renewable energy by 2013
The National Forest Policy	1986	Aims to ensure the adequate supply of industrial timber and fuel wood; provision of livelihood for upland communities; and restoration and maintenance of a stable, functional and wholesome environment
Community-Based Forest Management (CBFM) Program	1995, 1996	Empowers people's organisations to manage one-third of state forestlands
Thailand		
The Enhancement and Conservation of Environmental Quality Act	1992	Includes enabling statutes for a series of media-specific environmental measures
10th National Social and Economic Development Plan	2007	Emphasises a sufficiency economy, decentralisation, forest conservation (at 30% of total area), and community involvement in decision making
Energy Conservation and Promotion Act	1993	Promotes energy efficiency and conservation in factories, large buildings, machinery, equipment and processes, and establishes a fund for the promotion of energy efficiency
Renewable Energy Targets	2004	Aims to have 8% of primary energy generated from renewable energy by 2011 (excluding traditional biomass)
Community Forest Bill/ Decentralisation Act	1999	Recognises the legal status of communities in Thailand's National Forest Reserves; proposes the establishment of community forests by rural communities to manage forest areas

Sources: World Rainforest Movement 2002, Emtage 2004, Sikor 2006, USAID 2007, WRI 2008.

Box 5.1 Defining co-benefits

The IPCC has defined co-benefits as "the benefits from policy options implemented for various reasons at the same time—including climate change mitigation—acknowledging that most policies resulting in GHG mitigation also have other, at least equally important, rationales" (IPCC 2007). This definition is useful for three reasons. First, it helps to get around much of the debate over whether, by treating developmental benefits as co-benefits, the term privileges the climate agenda over the developmental agenda. Second, rather than focusing on the intent of policies that deliver co-benefits, it recognises that policies that are explicitly designed to mitigate GHG and explicitly designed to pursue developmental objectives can generate developmental or climate co-benefits. Third, it does not limit co-benefits to improvements in local air quality and improvements in public health; co-benefits can range from enhanced energy security to reduced incidences of traffic accidents to induced technology transfer.

A post-2012 regime that effectively recognised developing countries for policies and measures that delivered developmental co-benefits and then rewarded countries for achieving those benefits promises to ease this tension. However, as is often the case with promising ideas, their value derives from realising, not articulating that promise. More concretely, operationalising this idea will require specifying which institutional arrangements will be employed to recognise co-benefits and which incentive structures will be established to reward countries for the delivery of said benefits. At a minimum, post-2012 proposals must address the four questions that are featured in Box 5.2 and will be referred to throughout the chapter.[7]

Box 5.2 Recognising and rewarding co-benefits

Recognising	1. Which institution(s) should be responsible for monitoring the delivery of co-benefits? 2. Which institution(s) should be responsible for measuring co-benefits?
Rewarding	1. What kind of institutional changes would be needed to reward co-benefits—i.e. a sustainable development crediting mechanism, the refinement of an existing rating system for pledged policies? 2. What kind of incentives would produce the most significant improvements in the implementation of policies that deliver co-benefits?

Unfortunately, designing a set of institutional arrangements and incentive structures that respond to these questions presents yet another challenge. This challenge arises, in part, from the fact that "existing international frameworks and agreements are not designed to promote integration between different policy areas and (existing) institutional structures often complicate such integration" (Kok 2006). Therefore, before assessing how effectively post-2012 proposals respond to the above four questions, it is important to re-examine how effectively the current climate change regime has promoted sustainable development.[8]

Upon initial inspection, a re-assessment of how effectively the current climate regime has contributed to sustainable development appears unwarranted. A closer examination, however, reveals the regime's reliance on developmental rhetoric.

5.4 Sustainable Development in the Current Climate Regime

Upon initial inspection, a re-assessment of how effectively the current climate regime has contributed to sustainable development appears unwarranted. As demonstrated in Table

7. It has been suggested that a fifth question should be which institution should facilitate the recognition of co-benefits and ensure that are reflected in climate actions.
8. I am interested in evaluating the current regime and post-2012 proposals in terms of their *effectiveness* in promoting sustainable development in the developing world. There are other criteria that I could use for these purposes, including equity, efficiency and participation. In the latter half of the chapter, I suggest that there might be trade-off between effectiveness and efficiency, as added layers of bureaucracy might run counter to the goal of promoting development.

5.4, the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and various decisions of the Conference of the Parties (COP) to the UNFCCC contain numerous references to sustainable development. A careful examination of these passages, however, reveals that they offer what comes closer to hortatory prescriptions than genuine incentives for development. During our consultations, similar concerns were raised about the regime's reliance on developmental rhetoric.

Table 5.4 Sustainable development and the current climate change regime

FCCC preamble	…responses to climate change should be coordinated with ***social and economic development in an integrated manner***…
FCCC art. 2	Such a level should be achieved within a time frame sufficient…to enable economic **development to proceed in a sustainable manner**.
FCCC art. 3.4	The Parties have a right to, and should, promote ***sustainable development***.
FCCC art. 4.7	…take…into account that ***economic and social development and poverty eradication*** are the first and overriding priorities of…developing country.
Kyoto art. 10	All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, and continuing to advance the implementation of these commitments in order to achieve ***sustainable development***…
CP 2 decision 10	…to emphasise the importance of the link between climate change and ***sustainable development***, request that non-Annex 1 Parties should seek to include programmes relating to ***sustainable development*** in their national communications.
CP 7 decision 1	…addressing the many challenges of climate change will make a contribution to achieving ***sustainable development***…
CP 7 decision 5	… so as to…ensure that adaptation actions are environmentally sound and will produce real benefits in support of ***sustainable development***…
CP 8 decision 1	…in order to respond to the challenges faced now and in the future, climate change and its adverse effects should be addressed while meeting the requirements of ***sustainable development***…
CP 10 decision 1	Insists that action relating to adaptation follow an assessment and evaluation process… so as to prevent maladaptation and to ensure that adaptation actions are environmentally sound and will produce real benefits in support of ***sustainable development***
CP 11 decision 1	Resolves to engage in a dialogue that includes…advancing development goals in a ***sustainable way***…
CP 13 decision 1	Nationally appropriate mitigation actions by developing country Parties in the context of ***sustainable development***, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner;

Yet, while the lack of incentives in the current climate regime was discussed at our consultations, much of the attention was focused on the mechanism in the regime that comes closest to offering genuine incentives for development, the CDM[9]. Article 12.2 of the Kyoto Protocol states the CDM is designed "to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention" (Kyoto Protocol, Article 12.2). In contrast to the rhetoric-heavy passages in table 5.4, however, the CDM could generate funding needed to reach this goal. If buyers of certified emissions reductions (CER) were motivated to support projects with significant developmental benefits, the CDM would go a long way to mobilising the resources required to address development needs. Although it is arguably too early to evaluate the CDM on this score, the consensus at our consultations (and in the literature) was that the mechanism has thus far fallen short of expectations (Pearson 2004, Olsen 2007).[10]

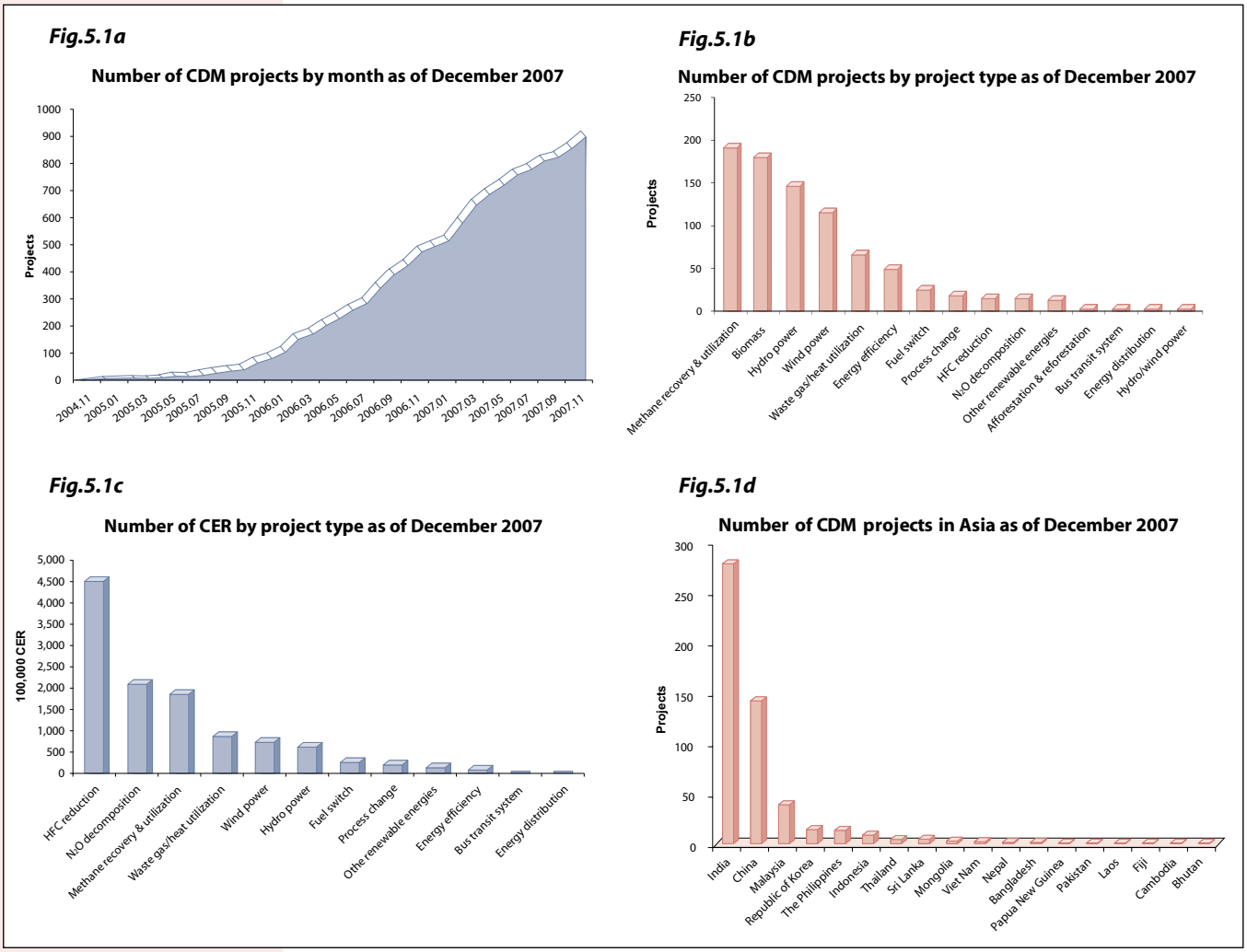
The vast majority of CER (and therefore investment funds) go to projects with few developmental benefits such as HFC-23 or N_2O destruction.

The data in Figure 5.1 help illustrate this shortfall. Since the entry into force of the Kyoto protocol in February 2005, there has been a dramatic increase in CDM projects. The number of projects with significant developmental benefits, moreover, has been generally well represented. Biomass, hydropower, and wind power projects are the second, third and fourth most numerous projects. The data also indicates that the vast majority of CER (and therefore investment funds) go to projects with few developmental benefits such as HFC-23 or N_2O destruction. In addition, the majority of projects are

9. This section benefited greatly from the presentations made by and discussions with Kazuhisa Koakutsu regarding the CDM.
10. Based on a review of 200 studies on the CDM, Olsen concludes that it has not "significantly contributed to sustainable development."

located in developing countries with comparatively few developmental needs. China, Brazil, and India account for 74% of the CER and are home to slightly more than two-thirds of the projects.[11]

Figure 5.1 Trends in the CDM



Source: IGES CDM Project Database, http://www.iges.or.jp/en/cdm/report.html.

It furthermore merits underlining that a reason that the CDM has underachieved is the institutional rules governing the project approval process. These rules enable host countries to use a variety of metrics to determine what constitutes "sustainable development." For many developing countries, which have an interest in getting projects approved first and considering their developmental implications later, this determination has reduced to "no harmful impacts" as opposed to more rigorous evaluative criteria (Cosbey et al. 2005). A related reason for the shortfall is that projects with low developmental benefits bring high volumes of CER—again, HFC-23 or N_2O destruction projects fit this characterisation. Hence, investors have an incentive to finance projects with fewer sustainable development benefits (IGES 2006).

It should nevertheless be noted that some countries and organisations have taken progressive steps to address the CDM's deficiencies.

It should nevertheless be noted that some countries and organisations have taken progressive steps to address these deficiencies. China, for instance, levies a 65% tax on

11. Some argue that this regional imbalance will be rectified when and if wealthier developing countries take on emission reduction targets.

HFC projects, a 30% tax on N_2O projects, and a 2% tax on the remainder of projects that is subsequently channelled into a sustainable development fund.[12] The World Bank has established a Community Development Carbon Fund (CDCF) to finance smaller CDM projects in poor rural communities that, without such a vehicle, would not attract resources from international investors (projects supported by CDCF pay a premium of 0.5 to 1 USD for CER achieved from these development friendly projects) (World Bank 2006).[13] The Philippines, Thailand, India, and Indonesia have established methods for measuring the developmental contribution of projects prior to their approval (IGES 2006). And, as featured in Box 5.3, the International Institute for Sustainable Development (IISD), the CDM Gold Standard, and the UNEP Risø centre (COSI tool) have devised tools and techniques to gauge the quality of CDM projects, which could potentially be scaled-up and adjusted to country-specific needs. (Cosbey et al. 2005, Olsen and Fenhann 2006, CDM Gold Standard 2007).[14]

Box 5.3 The IISD Developmental Dividend, CDM Gold Standard and UNEP Risø Centre Carbon Offset Sustainability Indicator (COSI) Tool

The **Developmental Dividend** is a research programme that the IISD initiated in 2005 to assess the benefits of climate actions "beyond those strictly related to climate change." The ultimate goal of the programme is to increase the quantity of quality CDM projects. Part of achieving that goal is building an evaluative framework to assess the developmental dividend from these projects. The framework is based on an international advisory group's weighting of standard social, environmental, and economic criteria. The framework then uses quantitative and qualitative data from CDM project design documents (PDDs) to arrive at developmental dividend scores for categories of CDM projects. These scores are intended chiefly for the international policy community to assess the developmental benefits of CDM projects, but they also can be employed domestically by designated national authorities (DNA).

The **Gold Standard** was initially conceived in 2002 by the World Wildlife Fund (WWF) with support from South*South*North and Helio International. It offers an "independent best practice benchmark" for investors willing to pay a premium for quality low-risk CDM projects. To earn gold standard certification, projects must meet standard CDM project approval requirements and pass through three additional approval screens. Credits must be earned from renewable energy or energy efficiency projects; projects must adhere to stringent additionality guidelines; and projects must comply with sustainability requirements that include two local stakeholder consultations, conformance with sustainability indicators, and, in some cases, an environmental impact assessment (EIA). There are currently 11 registered gold standard CDM projects, eight of which are located in Asia.

In 2006, the United Nations Environmental Programme (UNEP) Risø centre began work on the **Carbon Offsets with Sustainability Indicators (COSI) tool**. The impetus for the COSI tool was the absence of a single unified set of sustainable development assessment standards and procedural guidelines for evaluating CDM projects. The tool, which is currently under development, will be constructed from a package of sustainable development criteria, assessment methodologies, and procedural guidelines.

While the CDM has thus far failed to promote sustainable development, there have been several noteworthy attempts to compensate for the mechanism's shortcomings.

In sum, while the CDM has thus far failed to promote sustainable development, there have been several noteworthy attempts to compensate for the mechanism's shortcomings. More central to this chapter's main argument, the most promising efforts

12. The use of the sustainable development fund has been a point of contention between China's National Development and Reform Commission (NDRC) and Ministry of Finance (MoF). Despite the fact that the NDRC is in charge of China's climate change issues, the MoF has been given jurisdiction over spending decisions.
13. Not all international organisations have been so proactive. Participants in our consultations noted that considerable attention has been paid to additionality of carbon benefits, not developmental benefits, in projects supported by international financial mechanisms such as the Global Environmental Facility (GEF).
14. These efforts have enjoyed support from some developed countries (especially in Scandinavia) that have demonstrated an interest in ensuring the environmental integrity of their investments.

have been aimed at reforming the institutional rules for measuring sustainability and restructuring incentives to achieve these newly defined goals. It is therefore important to consider the design of institutional rules in proposals for the post-2012 regime.

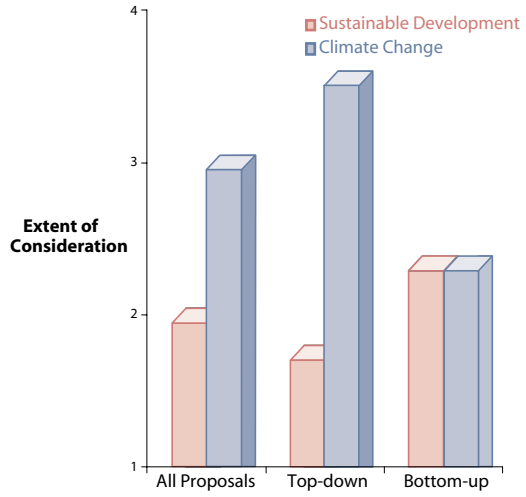
5.5 Sustainable Development and Post-2012 Proposals

While many participants at our consultations faulted the CDM for the regime's disappointing performance in promoting sustainable development, some were more willing to withhold judgment, suggesting that the mechanism is just beginning to gain traction and may be revised in the future to make it more development-friendly. Others maintained that even a revised CDM must be scaled up to the sectoral or programmatic level if it is to have its intended effects on development. Yet others, joining together the sentiments highlighted above, remarked that, especially for large emitters, there must be a concerted effort to go beyond the CDM and restructure the post-2012 regime itself.

Bottom-up proposals enable countries to pledge policies and measures that both sustain development and mitigate GHG.

Fortunately, there are no shortages of post-2012 proposals advanced with this end in mind. The vast majority of these proposals can be categorised as bottom-up as opposed to top-down proposals. The primary distinction between the two categories is that, rather than establishing aggregate emission targets and allocating emissions commitments to individual countries, bottom-up proposals enable countries to pledge policies and measures (PAMs) that both sustain development and mitigate GHG—that is, measures that generate developmental co-benefits. Figure 5.2, which presents the results of an IGES evaluation of the attention given to "developmental" and "climate" concerns in twenty post-2012 climate regime proposals, shows that, on average, bottom-up proposals place a greater emphasis on development than their top-down counterparts (IGES 2006).[15]

Figure 5.2 The extent of consideration given to climate and development concerns in post-2012 proposals



In 2006, IGES conducted an independent assessment of "the extent of consideration" given to climate change and development in twenty post-2012 climate change proposals. Proposals were coded on a four point scale, with one indicating "no consideration" and four indicating "significant consideration."[16] Half of the selected proposals were top-down proposals and half were bottom-up proposals. Figure 5.2 illustrates the average level of consideration given to climate and development for all of the proposals and each type of proposal. The figure demonstrates that, on average, top-down proposals place a greater emphasis on climate than development, while bottom-up proposals give climate and development equal weight.

Source: IGES 2006

15. It is important to point out that some top-down proposals have a strong developmental orientation. For instance, the Brazilian proposal would base emissions targets on historical responsibility for climate change and establish a Clean Development Fund for developing countries.
16. The rating scheme was based upon the number of indicators in the proposal that referred to "development." Proposals with one indicator were scored as giving "low consideration," while those with two indicators were scored as giving "some consideration" and those with three or more were scored as giving "significant consideration." The scheme is obviously subjective, but it is meant to provide a sense of how much each proposal could meet important criteria.

Bottom-up proposals have several other noteworthy strengths (Carraro 2006).[17] First, by allowing countries to pledge their own policies, they can account for unique national circumstances (South Africa 2006). Second, by recognising that developmental policies can generate reductions in carbon, they can stem the criticism often levelled at developing countries for a perceived unwillingness to take climate actions (Associated Press 2007).[18] Third, by stressing the integration between different policy objectives, they can enhance coordination between government agencies that might otherwise have conflicting organisational priorities and operational mandates (Kok 2006).

Bottom-up proposals have several noteworthy strengths: they can account for unique national circumstances; stem criticism for perceived inaction; and enhance inter-agency coordination.

Yet, and this is a critical qualifier, bottom-up proposals have as many weaknesses as strengths. First, the very notion of "development" is relative to a country's stage of development, leading to possible disputes over how the concept is defined and measured. Second, the ability of these proposals to achieve developmental goals rests precariously on the assumption that an "intrinsic drive" (Pan 2006) to develop will overcome obstacles that typically undermine regulatory initiatives in the developing world (Janicke and Weidner 1997, Desai 1998, see also Pearce 2000 for a discussion related to co-benefits). Third, bottom-up proposals move closer to a fragmented institutional framework wherein the pledging of nationally unique policies and measures will drive up international monitoring and enforcement costs (Bradley et al. 2005).[19]

The above weaknesses—the definition of development, barriers to implementation, and increased enforcement costs—can, to a certain degree, be managed. However, the success with which they are managed depends upon how particular proposals "turn the conceptual link between sustainable development and climate change into a workable approach" (Winkler et al. 2005). More specifically, it hinges on the institutional arrangements used to measure co-benefits and the incentives to implement pledged policies—or how particular proposals respond to the four aforementioned questions in Box 5.2. The post-2012 proposal that addresses these questions most explicitly is known as Sustainable Development Policies and Measures (SD-PAMs).

Bottom-up proposals have as many weaknesses as strengths: they can generate conflicts over the definition of development; assume policies will be implemented effectively; and increase monitoring and enforcement costs.

5.5.1 Sustainable development policies and measures (SD-PAMs)

SD- PAMs (formalised as the South Africa proposal in 2006) drew a considerable amount of interest during our consultations, yet even those expressing this interest were not intimately familiar with the design elements that turned the proposal into "a workable approach." When asked about these functional features, the typical response was that SD-PAMs was "important and needs to be studied further." Since these operational details are integral to assessing how successfully SD-PAMs could handle the weaknesses associated with bottom-up proposals, they are highlighted in the following description of the proposal's envisioned implementation and the step-by-step diagram in Figure 5.3.

SD-PAMs would be operationalised through a nine-step process. The process would begin with developing countries outlining their developmental objectives and identifying policies and measures that could meet these objectives in a more sustainable

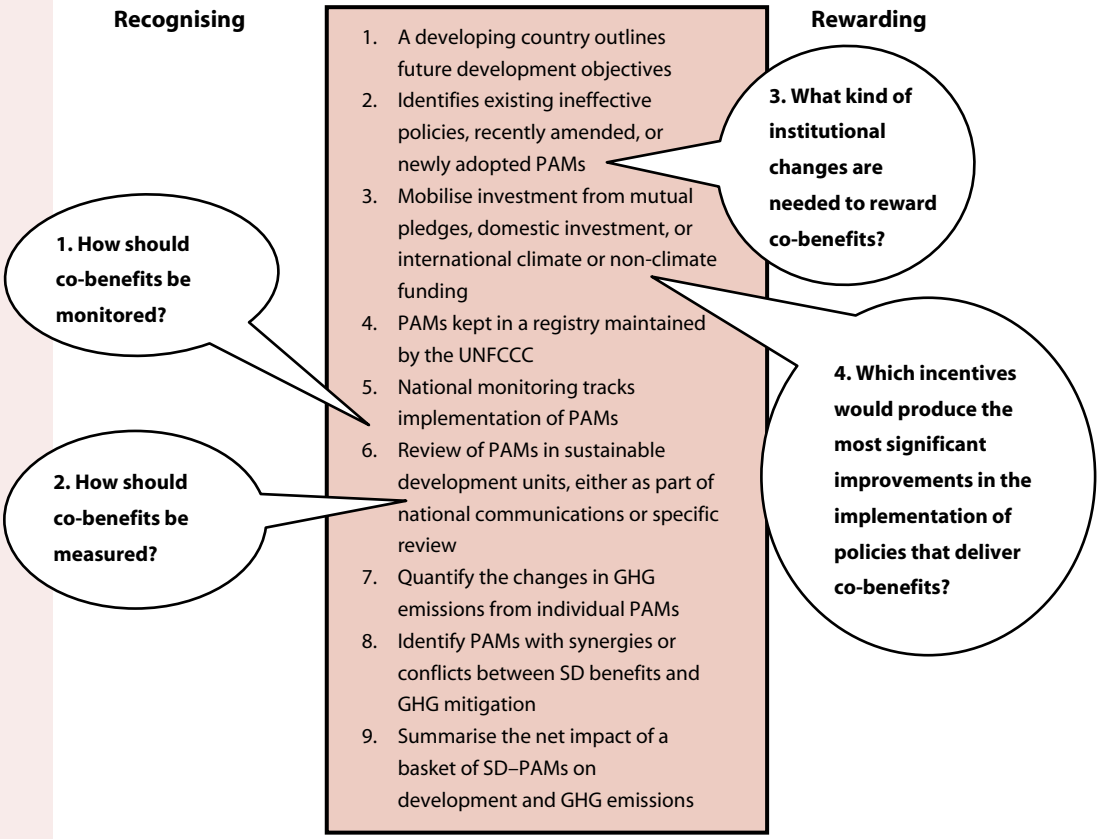
17. Carraro suggests that a bottom-up regional approach is also the most politically feasible approach, given diverse priorities and interests.
18. The United States cites the lack of exemptions from emissions targets for non-Annex 1 countries as one of the chief reasons for not ratifying the Kyoto protocol. This criticism increased after the Netherlands Environmental Assessment Agency published findings suggesting that China had surpassed the United States as the world's top emitter of carbon dioxide.
19. This is most evident in the United Nations Convention on Combating Desertification that has a decentralised national action plan structure but has struggled with a wide range of practical implementation issues. See Stringer et al. 2006.

manner.[20] Where possible, sustainable development indicators (Winkler et al. 2005) or key performance indicators (South Africa 2006) would be used to assess developmental benefits, while standard UNFCCC reporting methods would be used to measure changes in GHG. Only SD-PAMs that delivered developmental benefits and mitigated GHG—measures where synergies as opposed to conflicts existed between the two goals—would become eligible for the next phase of the process.

In SD-PAMs, the amount of GHG mitigated, not the developmental benefits generated, would determine the level of funding.

In this next phase, a basket of SD-PAMs would be reported to the UNFCCC through the current regime's national communications or, if this channel proved too contentious, an alternative reporting mechanism. The UNFCCC would maintain a registry of SD-PAMs and host countries would monitor the implementation of pledged policies. Funding for the SD-PAMs would come chiefly from developed countries through the sale of CER in a scaled-up sectoral CDM or joint bi/multilateral pledges. The amount of GHG mitigated, not the developmental benefits generated, would determine the level of funding; however, an unspecified sum of resources could flow from the GEF as well as related UNFCCC and the Kyoto Protocol funds[21] (Baumert and Winkler 2005).

Figure 5.3 Nine steps to implementing SD-PAMs



5.5.2 Other bottom-up proposals

Before evaluating the extent to which SD-PAMs addressed the aforementioned weaknesses, it warrants underlining that other proposals draw upon the approach. A sectoral CDM, for instance, would enable developing countries to earn CER for

20. These could be either existing policies or policies that are not fully implemented.
21. These funds include the Least Developed Country (LDC) fund, the Special Climate Change (SCC) fund and the Adaptation fund.

emission reductions from pledged sectoral policies that meet host country's sustainable development criteria. A sectoral CDM would also encourage cross-subsidisation between "sectoral policies with high climate and low developmental benefits" and "sectoral policies with low climate and high developmental benefits" (Samaniego and Figueres 2005, Ellis 2006). The South-North Dialogue, another proposal that draws upon the SD-PAM approach, divides countries into six groups based upon "responsibility," "capacity," and "mitigation potential" indicators, and then requires different categories of countries to pledge SD-PAMs. The poorest countries would be offered full funding to implement voluntarily pledged policies; less generous funding arrangements would be accorded to wealthier developing countries for mandatory pledges (Ott et al. 2004).

Finally, there are some proposals that require that countries implement measures that generate co-benefits, but do not draw directly on the SD-PAMs approach. These include the Development Rights proposal, which would oblige all countries to implement "no regrets" measures and require developing countries to expend resources otherwise reserved for climate change on human development (Athanasiou et al. 2006).

Table 5.5 Recognising and rewarding co-benefits in selected proposals on post-2012 climate regime

Proposal / Four Questions	SD-PAMs	Sectoral CDM	Global Development Rights	South-North Dialogue
1. Which institution(s) monitors co-benefits?	Host country monitors; UNFCCC maintains registry of SD-PAMs	*Not Specified*	*Not Specified*	*Not Specified*
2. Which institution(s) measures co-benefits?	Host country reports/ monitors PAMs with SD indicators	Host countries determine SD criteria for pledged policies	All countries take "no regrets" measures; rigorously defining "no regrets" will be a challenge	*Not Specified*
3. Which institution(s) reward co-benefits?	Funding from sectoral CDM, GEF, regime funds	Funding from sectoral CDM, with possible cross-subsidisation	Countries below development threshold fund "human development" at a level indexed to an obligation indicator	LDCs receive full financing for SD-PAMs; Co-financing or no financing for wealthier DCs
4. What incentives produce the largest improvements in policies that deliver co-benefits?	Synergistic policies qualify for funding	*Not Specified*	*Not Specified*	*Not Specified*

None of the reviewed proposals details the operational rules needed to recognise and reward co-benefits as explicitly as SD-PAMs.

As highlighted in Table 5.5, none of the reviewed proposals details the operational rules needed to recognise and reward co-benefits as explicitly as SD-PAMs. This is, in part, because these proposals are designed to remedy other weaknesses in the current regime—for instance, modifying the commitment levels for different countries.[22] It is also, in part, because outlining a proposal's overarching objectives is easier than specifying the steps needed to achieve stated goals. Yet, as the current regime's reliance on developmental rhetoric attests, there are pitfalls to allowing aspirational ends to overshadow operational means.

As the current regime's reliance on developmental rhetoric attests, there are pitfalls to allowing aspirational ends to overshadow operational means.

22. It should be underlined that these additional proposals are often designed to meet other needs, such as scaling up the CDM (sectoral CDM).

Under SD-PAMs, it is clear that funding would come from CER and other regime related funds. It is unclear, however, whether implicitly indexing funding to the GHG mitigation potential of pledged policies would help realise the developmental contribution of those policies.

While SD-PAMs averts similar pitfalls, in so doing it exemplifies other limitations associated with bottom-up proposals. Under SD-PAMs, for instance, it is clear that developing countries can pledge "synergistic" policies that are measured in "sustainable development units." It is, however, unclear whether such criteria would be demonstrably different from the problematic "no harmful impacts" criteria some countries have adopted for CDM projects. Under SD-PAMs, to cite another example, it is clear that funding would come from CER and other regime related funds. It is unclear, however, whether implicitly indexing funding to the GHG mitigation potential of pledged policies would help realise the developmental contribution of those policies, especially in cases that climate benefits are significantly less than developmental benefits.

5.6 Three Familiar Themes: Responses to an IGES Questionnaire

To determine how these limitations might be addressed, a questionnaire was distributed to scholars and policymakers familiar with co-benefits and post-2012 issues (Appendix D). The survey contained both general questions about the current regime and specific inquiries about co-benefits and post-2012 proposals. One respondent was reluctant to answer the questionnaire because its definition of co-benefits—the additional and locally desirable benefits of climate actions—privileged climate over developmental issues. The other respondents (the response rate was 48.5%) provided revealing insights into the measurement of developmental benefits, the incentives to overcome barriers, and the operational costs that would accompany institutional reforms. The insights into these three familiar themes (the three weaknesses associated with bottom-up proposals) are summarised in turn below, beginning with measurement issues.

Most respondents indicated that developing countries should be allowed to measure and monitor their own developmental benefits. Some respondents, however, suggested that responsibilities should be shared between international, national, and local level stakeholders. Yet other respondents maintained that, while national governments and the UNFCCC should divide these responsibilities, standardising the metrics and methods for evaluating co-benefits was more critical than assigning responsibilities for their measurement. Procedural uniformity was stressed as the best way to move beyond useful albeit ambiguous "sustainable development indicators" and arrive at metrics that could be estimated domestically, verified internationally, and thereby rewarded credibly (Hardi and Zdan 1997, Bell and Morse 1999, Parris and Kates 2003).

As for rewarding co-benefits, the majority of respondents indicated that earmarking regime-related financing and training for well-specified developmental needs as opposed to broadly defined sustainable development funds or comparably broad technical assistance and capacity building was the most promising route to enhancing policy implementation. Rather than accomplishing this task by formally linking integrated policies to a newly created market of sustainable development credits, respondents felt that the aforementioned standardisation of sustainability criteria would help raise the profile of integrated policies and, in turn, strengthen the linkages to mechanisms within (a scaled-up CDM and regime-related funds) and outside (voluntary carbon market, multilateral carbon funds, domestic sustainable development funds) the post-2012 regime.

The hesitation to link rewards to developmental benefits arguably stems from concerns over enforcement and monitoring costs, the third theme that stood out in

the responses to the questionnaire. Though questions did not focus on these costs specifically, respondents referred to them on multiple occasions in multiple contexts. Several respondents, for instance, wondered whether the gains from establishing new sustainable development credits would offset the costs of administering a parallel crediting mechanism. Some respondents worried that formally recognising co-benefits would create baseline, additionality, and double counting issues of a far greater complexity than experienced with the current CDM (CDM Executive Board 2005, IGES 2006). Yet other respondents questioned if additional co-benefit architecture might increase the administrative burden on the UNFCCC and, more importantly, host country climate and development agencies.

5.7 Recommendations for Moving Forward: Implications for Asia

This chapter began with the observation that developing Asia's participation in the post-2012 regime is both imperative and challenging (from the perspective of practicality, affordability and measurability). Bottom-up proposals hold the greatest promise to meet this challenge, though their success rests on how they recognise and reward co-benefits. SD-PAMs outlines how this could be achieved more explicitly than other post-2012 proposals; it could nonetheless be enhanced with standardised criteria to evaluate the sustainability of pledged policies, well-defined linkages between climate regime-related resources and domestic developmental needs, and due consideration of the administrative costs of implementing recommended reforms. The chapter ends where it began, making these general recommendations applicable to developing Asia.

(a) *Recommendations for Researchers*

A first step forward is standardising metrics to evaluate the sustainability of pledged policies. Harmonising and scaling-up techniques such as IISD's developmental dividend, CDM Gold Standard and the UNEP COSI tool would reduce confusion from multiple estimation techniques and be consisent with the recent emphasis in the Bali Action Plan on "national mitigation actions supported by financing, and capacity-building, in a *measurable, reportable, and verifiable manner* (UNFCCC 2007)." Streamlining chosen estimation procedures, especially for policymakers confronting data, time and budget constraints, would dramatically increase the selected tools' utility (ADB 1996). It should nevertheless be noted that this will be challenging, for the quantification of developmental benefits promises to be technically complex and politically controversial.

A first step forward is standardising metrics to evaluate the contribution of pledged policies and measures to sustainability.

To make the challenge more manageable, the World Bank, the Asian Development Bank (ADB) and organisations providing Official Development Assistance (ODA) (such as the Japan International Cooperation Agency) should support these efforts, since the development community has accrued significant experience with project-based environmental impact assessments. A uniform intuitive method for evaluating developmental impacts would also prove helpful in recently launched clean energy investment frameworks by the World Bank and ADB. ("Investment Framework for Clean Energy and Development" and "Asia Pacific Fund for Energy Efficiency") (World Bank 2006, ADB 2006). These efforts, however, need to gain support of researchers outside the development community, since much of the co-benefit scholarship has thus far been devoted to generating sizable co-benefit estimates that have not had a commensurately sizable impact on policy decisions in Asia (IGES 2007).

In seeking to enhance these impacts, researchers should concentrate on devising rapid analytical methods—"'a practical and quick' evaluation of the potential magnitude or range of potential impact values based on readily observable measures" (Asian Development Bank 1996). In so doing, their ultimate aim should be constructing a set of tools that national and local policymakers can use to provide a preliminary scoping of the expected health, welfare, and environmental benefits of a common set of integrated policies (demand and supply side energy efficiency policies; renewable energy standards; fuel efficiency and emissions standards; and avoided deforestation programmes). They should then consider equipping a certifying body in the UNFCCC or an alternative international organisation with primary valuation techniques to provide a more rigorous evaluation of initially scoped benefits (Smith and Haigler 2007).

Policymakers in developing Asia should prioritise integrated policies that stand to benefit the most from climate regime-related financial and technical support.

(b) *Recommendations for Policymakers*

While researchers focus on standardising rapid analytical methods and primary valuation techniques, policymakers in developing Asia should consider conducting an assessment of developmental policies that would, in addition to incorporating initially scoped developmental estimates, prioritise integrated actions that stand to benefit the most from climate regime-related financial and technical support. China, for instance, recently released its First National Climate Change Action Programme, which compiles many of the country's energy efficiency, energy conservation, and deforestation targets from other high-profile policy documents (National Development and Reform Commission 2007). Such a comprehensive plan might serve as a useful blueprint for other developing countries in Asia, since an annotated listing of integrated policies and measures would ensure that opportunties to benefit from regime-related training, technnology and targeted investments do not go overlooked and thereby unrealised. Bilateral and multi-lateral ODA may also be used to preferentially support integrated policies and measures identified in such plans.

An overarching national plan, though arguably necessary, will nonetheless be insufficient to guarantee that the co-benefits of integrated policies are captured. Returning again to the case of China, many of the proposed energy efficiency targets in the First National Climate Change Action Programme have thus far proven difficult to achieve (Holdren 2007). In prioritising policies, then, policymakers must not only be creative in identifying integrated policies but vigilant in identifying where regime-related investments could and could not be used to support the implementation of integrated mitigation strategies. This determination will, of course, vary across countries and sectors depending upon a host of barriers, including but not limited to institutional capacity, inter-agency coordination, and vested interests that may undermine the use of external resources.

Climate negotiators should consider establishing a tax or other fiscal measures on CER earned from policies with high climate and low developmental benefits.

To help overcome these barriers and strengthen incentives for the enhanced implementation of integrated policies, climate negotiators should consider establishing a tax or other fiscal measures on CER earned from policies with high climate and low developmental benefits. The chosen mechanism would be similar to the tax that China currently levies on CDM projects, but it would also be distinct in that it would be overseen and administered by the same UNFCCC organisation or alternative body that reviewed initially scoped co-benefits. The number of members on this body, regional representation, and decision-making rules is apt to be controversial, yet best efforts should be made to ensure that allocation of resources be indexed, within reasonable confidence intervals, to the co-benefits of pledged policies where there is shortage of climate benefits.[23]

23. In some of these cases, multi-lateral and bi-lateral aid can be used to support high development/ low-carbon policies.

(c) Recommendations for Climate Negotiators

Lastly, so that monitoring and enforcement costs can be minimised, these standardising and incentive-based reforms should be piloted regionally. Since developing Asia is both a signicant contributor to, and is projected to suffer significantly from, climate change, few regions could offer the opportunities and lessons learned from using standardised streamlined techniques that were linked to regime-related support. Climate negotiators should therefore consider gradually scaling proposed bottom-up reforms in a step-wise manner, beginning with voluntary pledges, the experimental use of simplified standardised tools, and the identification of linkages to priotorised integrated policies. During this process, climate negotiators should pay close attention to the costs of administering reforms prior to introducing mandatory pledges, codifying standardised sustainability metrics, and institutionalising linkages to prioritised policies.

Climate negotiators should pay close attention to the costs of administering reforms prior to introducing mandatory pledges, codifying standardised sustainability metrics, and institutionalising linkages to prioritised policies.

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Appendices

Appendix A

Asia-Pacific Consultation on the Climate Regime Beyond 2012 – South Asia

29-30 August 2007, Ashok Hotel, Delhi, India

Agenda

Day 1: Wednesday, 29 August 2007

08:30 – 09:00	**Registration**
09:00 – 10:45	**Session 1: Overview of IGES consultations and national perspectives** **Session Chair: Prof. Hironori Hamanaka, Chair of the Board of Directors, IGES**
09:00 – 09:10	Welcome remarks Prof. Hironori Hamanaka, IGES
09:10 – 09:20	Opening remarks Dr. R K Pachauri, TERI
09:20 – 09:50	Objectives and scope of consultations Dr. Ancha Srinivasan, IGES
09:50 – 10:10	India's perspectives on the post-2012 climate regime Dr. Pradipto Ghosh, TERI
10:10 – 10:30	General Discussion
10:30 – 10:45	*Coffee/Tea Break*
10:45 – 13:15	**Session 2: Sectoral approaches in the post-2012 regime** **Session Chair: Dr. Ajay Mathur, Bureau of Energy Efficiency, Ministry of Power**
10:45 – 11:15	Overview of sectoral approaches: Need for a new institutional framework Ms. Hitomi Kimura, IGES
11:15 – 11:45	Sectoral approaches in the post-2012 regime: Developing country perspectives Prof. Jyoti Parikh, Integrated Research and Action for Development (IRADE)
11:45 – 12:15	Sectoral approaches in the post-2012 regime: Developed country perspectives Mr. Sandeep Tandon, United States Agency for International Development (USAID)
12:15 – 12:45	Sectoral and policy-based approaches – Perspectives from international organisations Dr. Philippine de T'Serclaes, International Energy Agency
12:45 – 13:15	General Discussion
13:15 – 14:30	*Lunch*
14:30 – 17:30	**Session 3: Low carbon technologies** **Session Chair: Dr. Anand Patwardhan, Technology Information, Forecasting and Assessment Council**
14:30 – 14:55	Technology development and transfer (TDT) in the future climate regime: Political feasibility of selected proposals Dr. Kentaro Tamura, IGES
14:55 – 15:20	Technology development and transfer: Developing country perspectives Dr. Ritu Mathur, TERI
15:20 – 15:50	General Discussion
15:50 – 16:10	*Coffee/Tea Break*
16:10 – 17:00	Technology development and transfer: Developed country perspectives - Ms. Heleen de Coninck, Energy Research Centre for the Netherlands and VU University of Amsterdam - Dr. David Ockwell, University of Sussex, UK
17:00 – 17:30	General Discussion
18:00 – 20:00	*Dinner Reception*

Day 2: Thursday, 30 August 2007

09:00 – 09:15	**Summary of Day 1 Mr. Sanjay Vashist, TERI**
09:15 – 12:40	**Session 4: Adaptation to climate change** **Session Chair: Prof. Chandrika Prasad, Uttar Pradesh Council for Agricultural Research**
09:15 – 09:40	Adaptation financing and mainstreaming: Issues and challenges for the post-2012 climate regime Dr. Ancha Srinivasan and Dr. Toshihiro Uchida, IGES
09:40 – 10:40	Adaptation financing and mainstreaming: Developing country perspectives - Dr. Sumana Bhattacharya, NATCOM - Dr. Sanjay Tomar, TERI - Dr. Ahsan Uddin Ahmed, Centre for Global Change, Bangladesh
10:40 – 11:00	*Coffee/Tea Break*
11:00 – 12:00	Adaptation financing and mainstreaming: Developed country perspectives - Mr. David Radcliff, Department for International Development, UK - Dr. Stephen McGurk, International Development Research Center, Canada - Ms. Pamposh Bhat, Deutsche Gesellschaft fur Technische Zusammenarbeit, Germany
12:00 – 12:20	Perspectives from international organisations (from the viewpoint of mainstreaming in operational decisions) Mr. Bhujang Dharmaji, International consultant (IUCN/UNDP)
12:20 – 12:40	General Discussion
12:40 – 14:00	*Lunch*
14:00 – 16:45	**Session 5: Co-benefits/development dividend Approach** **Session Chair: Dr. Stephen McGruk, International Development Research Centre, Canada**
14:00 – 14:25	Recognising and rewarding co-benefits in the post-2012 climate regime Dr. Eric Zusman, IGES
14:25 – 14:45	Promoting co-benefits through a restructured CDM in the post-2012 regime Mr. Kazuhisa Koakutsu, IGES
14:45 – 15:05	Promoting and rewarding co-benefits in climate regime: Developing country perspectives Dr. Leena Srivastava, TERI
15:05 – 15:20	*Coffee/Tea Break*
15:20 – 16:00	Co-benefits promotion from a developed country perspective - Mr. Kotaro Kawamata, Ministry of the Environment, Japan - Mr. Tsutomu Uchida, Japan Bank for International Cooperation, Japan
16:00 – 16:20	Perspectives from international organisations (from the viewpoint of mainstreaming a co-benefits approach in operational decisions) Dr. Charles Cormier, World Bank
16:20 – 16:45	General Discussion
16:45 - 18:00	**Session 6: Open Forum** **(India and the post-2012 climate regime: Opportunities and challenges)** **Facilitator: Dr. Prodipto Ghosh, TERI**
16:45 – 17:45	Panel members: Dr. Atul Kumar, TERI Dr. Ajay Mathur, Bureau of Energy Efficiency, Ministry of Power Dr. Bharat Desai, Jawaharlal Nehru University Mr. R P Sharma, Zenith Energy Services Pvt. Ltd. Dr. P Rambabu, CanterCO_2
17:45 – 18:00	Closing remarks Dr. Prodipto Ghosh, TERI Prof. Hironori Hamanaka, IGES

Asia-Pacific Consultation on the Climate Regime Beyond 2012 – East Asia

13-14 September 2007, Guohong Hotel, Beijing, China

Agenda

Day 1: Thursday, 13 September 2007

08:30 – 09:00	**Registration**
09:00 – 10:30	**Session 1: Overview of IGES Consultations and National Perspectives** **Session Chair: Prof. Hironori Hamanaka, IGES**
09:00 – 09:10	Opening remarks Prof. Hironori Hamanaka, Chair of the Board of Directors, IGES, Japan
09:10 – 09:15	Welcome remarks Dr. Kejun Jiang, Energy Research Institute (ERI), China
09:15 – 09:20	Welcome remarks Prof. Inhwan Kim, Keimyung University (KU), Republic of Korea
09:20 – 09:45	Objective and scope of the consultations Dr. Ancha Srinivasan, IGES
09:45 – 10:00	Republic of Korea's perspectives on the post-2012 climate regime Dr. Myung-Kyoon Lee, Keimyung University
10:00 – 10:20	Carbon standards for basic needs: Building a global climate regime aiming at equity and sustainability Prof. Pan Jiahua, Chinese Academy of Social Science, China
10:20 – 10:30	General Discussion
10:30 – 10:45	*Coffee/Tea Break*
10:45 – 13:15	**Session 2: Sectoral Approaches in the Post-2012 Regime** **Session Chair: Dr. Kejun Jiang, ERI**
10:45 – 11:10	Sectoral approaches in the post-2012 climate regime: Need for an institutional framework Ms. Hitomi Kimura, IGES
11:10 – 11:30	Role of sectoral approaches in the post-2012 Dr. Duan Maosheng, Tsinghua University, China
11:30 – 11:50	Sectoral approaches forestry related issue: developing countries perspective Ms. Moekti Handajani Soejachmoen (Kuki), Pelangi, Indonesia
11:50 – 12:10	Sectoral approaches in the post-2012 regime: Developed country perspective Prof. Asuka Jusen, Tohoku University, Japan
12:10 – 12:30	Policy-based commitments in a post-2012 framework Dr. Joanna Lewis, Pew Center, USA
12:30 – 12:50	Sectoral approaches – A role for China? Ms. Julia Reinaud, International Energy Agency (IEA), France
12:50 – 13:15	General Discussion
13:15 – 14:15	*Lunch*
14:15 – 18:00	**Session 3: Low Carbon Technologies** **Session Chair: Prof. Liu Deshun, Tsinghua University**
14:15 – 14:40	Technology development and transfer (TDT) in the future climate regime: political feasibility of selected proposals Dr. Kentaro Tamura, IGES
14:40 – 15:00	Technology development: A key for GHG mitigation Dr. Kejun Jiang, ERI
15:00 – 15:20	Development and transfer of low carbon technologies: A perspective from India Prof. P R Shukla, Indian Institute of Management (IIMA), India
15:20 – 15:40	Low carbon technologies: reference vs. stabilization scenarios for Korea Prof. Hoesung Lee, Keimyung University
15:40 – 16:00	*Coffee/Tea Break*
16:00 – 16:20	Demand for clean energy technology in global markets under a developing climate policy – developed country perspective Prof. Ilkka Savolainen, VTT Technical Research Centre of Finland
16:20 – 16:40	Promoting technology transfer through a sectoral approach Ms. Miki Yanagi, The Institute of Energy Economics, Japan (IEEJ)
16:40 - 17:00	China's perspectives on the future climate regime Ms. Li Liyan, National Development and Reform Commission (NDRC)
17:00 - 18:00	General Discussion
18:30 - 20:00	*Dinner Reception*

Day 2: Friday, 14 September 2007

09:00 – 09:30	**Summary of Day 1 Dr. Ancha Srinivasan, IGES**
09:30 – 11:05	**Session 4: Adaptation to Climate Change** **Session Chair: Prof. Hoesung Lee, Keimyung University**
09:30 – 10:00	Adaptation financing and mainstreaming: Issues and challenges for the post-2012 climate regime Dr. Ancha Srinivasan and Dr. Toshihiro Uchida, IGES
10:00 – 10:20	Adaptation financing and mainstreaming: Developing country perspectives Prof. Lin Erda, Chinese Academy of Agriculture Sciences (CAAS), China
10:20 – 10:40	Adaptation financing and mainstreaming: JBIC experiences Mr. Tomonori Sudo, Japan Bank for International Cooperation (JBIC), Japan
10:40 – 11:05	General Discussion
11:05 – 11:30	*Coffee/Tea Break*
11:30 – 13:00	**Session 5: Co-benefits/Development Dividend Approach** **Session Chair: Prof. Inhwan Kim, Keimyung University, Korea**
11:30 – 12:00	Recognising and rewarding co-benefits in the post-2012 climate regime Dr. Eric Zusman, IGES
12:00 – 12:30	Post 2012 climate regime Ms. Shuang Zheng, ERI
12:30 – 13:00	The economic analysis of photovoltaic systems in an apartment complex in Korea Mr. Jinhyung Kim, Keimyung University
13:00 – 14:30	*Lunch*
14:30 – 15:45	**Session 5 (Cont'd)**
14:30 – 15:00	Perspectives and Initiatives of Japanese government on co-benefits approach Mr. Akinori Ogawa, United Nations University, Japan
15:00 – 15:30	The CDM and its development dividend Ms. Deborah Murphy, International Institute for Sustainable Development (IISD), Canada
15:30 – 15:45	General Discussion
15:45 – 16:15	*Coffee/Tea Break*
16:15 – 18:45	**Session 6: Open Forum** **(China and the Post-2012 climate regime: Opportunities and challenges)** **Facilitator: Dr. Kejun Jiang, ERI**
16:15 – 18:30	Mr. Sun Guoshun, Ministry of Foreign Affairs Mr. Ye Weijia, Fuping Development Institute Dr. Xu Xiangyang, Chinese Academy of Agricultural Sciences Ms. Zhang Weihong, Beijing Equity Exchange Mr. Liu Qiang, ERI
18:30 – 18:45	Closing remarks Dr. Kejun Jiang, ERI Dr. Hoesung Lee, Keimyung University Prof. Hironori Hamanaka, IGES

Participating Organisations

Bangladesh	Bangladesh Unnayan Parishad
Canada	International Institute for Sustainable Development (IISD)
	International Development Research Center (IDRC)
China	Beijing Municipal Commission of Development and Reform
	Beijing Security Co. Ltd.
	China Academy of Transportation Sciences
	China Beijing Equity Exchange (CBEX)
	China Environment and Sustainable Development Reference and Research Center (CESDRRC)
	China Meteorological Administration
	China University of Mining and Technology
	Chinese Academy for Environmental Planning (CAEP)
	Chinese Academy of Agricultural Sciences (CAAS)
	Chinese Academy of Science (CAS)
	Chinese Academy of Social Sciences (CASS)
	Chinese Research Academy of Environmental Sciences (CRAES)
	Clean Air Initiative for Asian Cities (CAI-Asia) China Project
	EU-China Energy and Climate Security Project
	Energy Research Institute (ERI)
	Environmental Systems Analysis Institute
	Heinrich Boell Foundation China Office
	Ministry of Foreign Affairs (MOFA)
	National Development and Reform Commission (NDRC)
	Renmin University of China
	Shanghai Institute for International Studies
	Sino-Energy Global Consulting Co., Ltd. (SIEGCO)
	State Environmental Protection Administration (SEPA)
	The Climate Group, China
	The Energy Foundation - Beijing Office
	Tsinghua University
	United Nations Development Programme, Beijing
	World Wildlife Fund, China
Finland	VTT Technical Research Centre of Finland
France	International Energy Agency (IEA)
Germany	Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ)
	Embassy of the Federal Republic of Germany, India
India	Bureau of Energy Efficiency (BEE), Ministry of Power
	CanterCO_2
	Carbon Minus India
	Clinton Climate Initiative, New Delhi
	Deloitte Touche Tohmatsu India Private Limited
	Development Alternatives
	Emergent Ventures India Private Limited
	Erudite Engineers Private Limited
	Grow Diesel Ventures
	Growdiesel Climate Care Council
	ICF International Inc.
	IT Power India
	India-Canada Environment Facility (ICEF)
	Indian Institute of Management (IIMA)
	Infrastructure Development Finance Company Limited
	Institute of Economic Growth
	Integrated Research and Action for Development (IRADE)
	International Development Enterprises India
	Jawaharlal Nehru University
	MGM International, India

Participating Organisations (Contd.)

India	Ministry of Chemicals and Fertilizers
	Ministry of Environment and Forests
	National Communication Project, Ministry of Environment and Forest-UNDP-GEF
	National Institute of Disaster Management
	Pricewaterhouse Coopers Private Limited
	Rabo India Finance Private Limited
	Sustainable Energy Solutions Private Limited
	Swiss Agency for Development and Cooperation (SDC), India
	Technology Information, Forecasting & Assessment Council (TIFAC)
	The Climate Group, India
	United Nations Development Programme, Global Environment Facility (UNDP/GEF)
	United States Agency for International Development (USAID), India
	Uttar Pradesh Council for Agricultural Research
	Winrock International, India
	World Bank, India
	Zenith Energy Services Private Limited
Indonesia	Pelangi
Japan	Institute of Energy Economics, Japan (IEEJ)
	Japan Bank for International Cooperation (JBIC)
	Japan International Cooperation Agency (JICA), China Office
	Ministry of the Environment, Japan (MOEJ)
	Tohoku University
	United Nations University (UNU)
Korea	Keimyung University
	Korea Environment Institute
Malaysia	Malaysia Prime Minister's Office
Norway	Royal Norwegian Embassy, India
Netherlands	Embassy of the Kingdom of the Netherlands, India
	Energy Research Center of the Netherlands
UK	British High Commission, India
	Chatham House
	University of Sussex
USA	Pew Center
	United States Agency for International Development (USAID)
	World Resources Institute (WRI)

IGES Questionnaire on Adaptation in Climate Regime Beyond 2012

A. Adaptation Agenda for Current Climate Negotiations

1. What are the three most important priorities for negotiations on adaptation at COP13 in Bali from your country's perspective?
   Please choose only three priorities listed below and then rank.

   a. Deciding on procedures to operationalise Adaptation Fund including its management
   b. Streamlining of rules for accessing adaptation funds such as Special Climate Change Fund and LDC Fund
   c. Widening the base of adaptation funds
   d. Preferential support mechanisms for LDCs and SIDS
   e. Making contributions to Special Climate Change Fund and LDC Fund mandatory for Annex 1 countries
   f. Exploring other options for financing of adaptation
   g. Guidelines for mainstreaming adaptation
   h. Capacity building for prioritisation of adaptation options
   i. Research support for adaptation assessments
   j. Assessment of progress through Nairobi Work Programme on impacts, vulnerability and adaptation
   k. Launch of discussions on a new international protocol on adaptation
   l. Others

2. Mitigation regime has clear baselines and targets. Is it possible to set such targets and baselines for adaptation in a given project area?
   --- Yes
   --- No

If yes, what are the most feasible criteria? Rank your preferences.

   a. Only socio-economic indicators should be used for baseline and target setting (In this case, baseline for adaptation can be determined based on an average of selected socio-economic indicators applied uniformly in all adaptation projects, and target could be set above the baseline to check if a project can achieve that target in a given time span)
   b. Only indicators of ecosystem services should be considered in baseline and the target setting
   c. Both socio-economic indicators and ecosystem services should be considered in baseline and the target setting
   d. Other criteria should be used for baseline and target setting (specify other criteria)

B. Adaptation Financing

1. Which principles are desirable from your country's perspective for determining the appropriate burden sharing of current and future adaptation costs in developing countries?
   Please choose only three principles among those listed below and then rank.

   a. Ability to pay principle based on average GDP or GNP per capita since 1992
   b. Beneficiaries pay principle (Local or national governments that benefit from a particular adaptation project bear the cost)
   c. Beneficiaries pay principle (countries that benefit from climate change (mostly those located in high latitudes) bear the burden)
   d. Beneficiaries pay principle (Firms or individuals who make profits in climate-change related businesses (e.g. emissions trading, CDM) bear the burden
   e. Historical responsibility determined on the basis of cumulative emissions since 1992 (UNFCCC adoption)
   f. Historical responsibility determined on the basis of cumulative emissions since 1850 (industrial revolution)
   g. Responsibility based on current and future emissions
   h. Other options

2. Are legally-binding commitments or market-based mechanisms feasible for delivering adaptation?
   --- Yes
   --- No

If yes, rank the most feasible options that can be proposed for negotiations from your country's perspective.

   a. A given percentage of all fossil fuel sales from Annex 1 countries should be set as a legally-binding commitment
   b. A given percentage of all fossil fuel sales in all countries should be set as a legally-binding commitment (Differentiation in percentage among countries is possible)
   c. A given percentage of ODA funds should be committed for supporting adaptation initiatives in developing countries
   d. Other options (please specify)

3. From your perspective, which financing approaches are likely to raise adequate amount of funds to meet current and future adaptation needs in developing countries?
Please choose only three approaches listed below and then rank.

a. Mandatory contributions from Annex 1 countries
b. Global carbon tax (all countries)
c. Increased levy from CDM
d. Levy from all market mechanisms
e. Mandatory contributions from all beneficiaries listed in question 1
f. Contributions based on cumulative historical responsibility of emissions
g. Specific percentage of all ODA
h. Others

4. Which allocation principles or approaches should be considered most in determining the share of adaptation funds by developing countries?
Please choose only three approaches among those listed below and then rank.

a. Vulnerability index of a nation
b. Vulnerability of an ecosystem(s) in all developing countries
c. Vulnerability of an affected community (communities) in all developing countries
d. Small Island Developing States (SIDS) only
e. LDCs and SIDS but not other developing countries
f. LDCs, SIDS and most vulnerable regions in other developing countries
g. Others

5. Do you see a greater role for the private sector in adaptation financing, as in GHG mitigation?
--- Yes
--- No

If yes, please choose only three options among those listed below and then rank.

a. Assessment of mitigation potential of adaptation projects and selling carbon credits
b. Payment for Ecosystem Services
c. Adaptation Vouchers
d. Adaptation Credits
e. Corporate social responsibility payments for adaptation
f. Allocation of part of sales of national development bonds
g. Targets for adaptation funding by Annex 1 countries to be facilitated through private sector
h. Establish public-private insurance partnerships to increase availability of insurance products (e.g., weather derivatives, micro-insurance)
i. Others (please specify)

6. If risk insurance mechanisms are to be used more extensively than before to support adaptation efforts in developing countries, which approaches are most desirable?
Please rank your preferences.

a. Creating an international insurance pool
b. Expanding the coverage of micro-insurance
c. Catastrophe bonds
d. Weather Derivatives and Hedge Funds
e. Others

C. Adaptation Mainstreaming

1. What are the three most important barriers for mainstreaming adaptation concerns into development planning in your country? Please choose only three barriers among those listed below and then rank.

a. Lack of awareness among policymakers about climate change impacts and their economic implications in each sector
b. Mismatch between the temporal and spatial scales of climate change projections and information needs of sector planners (For example, very few climate models can predict rainfall patterns in Asian countries with certainty or on timescales relevant to policymakers)
c. Lack of capacity of officials to integrate adaptation information into sector planning processes
d. Limited leverage of environment ministries on sectoral development agencies and their policies
e. High reliance on structural and technological options which are inflexible and insensitive to local contexts, and are technologically and financially demanding
f. Inappropriate means to connect stakeholder interests and climate change impacts
g. Others

2. How can the future climate regime facilitate adaptation mainstreaming efforts at various levels? Please choose only three most important options among those listed below and then rank.

a. Maintaining a database of good practices for mainstreaming at policy and operational levels
b. Providing technical guidance to development agencies to preferentially support mainstreaming efforts
c. Organising capacity building workshops on mainstreaming options in critical sectors
d. Providing tools for inter-agency coordination and mainstreaming to policymakers
e. Insisting that all adaptation efforts supported by donor agencies should consider future impacts of climate change
f. Directed international financial assistance for mainstreaming efforts
g. Recognising and rewarding unique adaptation mainstreaming efforts in developing countries
h. Others (please indicate)

3. What are the most important ways for mainstreaming adaptation concerns in development planning in your country? Please choose one under each sub-section.

(a) Information related efforts

a. Framing adaptation issues in the context of policy making
b. Raising awareness of local impacts and coping strategies
c. Improving the relevance of scientific outputs
d. Generating intelligent information
e. Others

(b) Incentives

a. Financial and career development incentives to officials for promoting adaptation
b. Conditional donor funding
c. Reorienting meteorological services
d. Communicating the economic case for adaptation options
e. Others (please specify)

(c) Institutions

a. Region-wide Adaptation Facility
b. Addressing by a ministry with a high level of leverage
c. Building "boundary institutions"
d. Fostering institutional linkages and coordination
e. Private sector
f. Others (please specify)

(d) International mechanisms

a. Developed countries to bear part of the efforts (ODA and skills)
b. Enabling environment
c. Regional/international capacity building initiatives
d. Others (please specify)

IGES Questionnaire on Recognising and Rewarding Co-Benefits in the Post-2012 Climate Regime

1. Has the current climate change regime successfully promoted sustainable development?

Yes	No
(Please Go to Question 3)	(Please Go to Question 2)

2. What are the main reasons you answered no? PLEASE CHECK ALL ANSWERS THAT APPLY

   a. Promoting sustainable development is not the climate regime's primary objective
   b. The Clean Development Mechanism (CDM) funds too many projects with limited development benefits (i.e. HFC destruction)
   c. There are too few incentives to promote sustainable development in the current regime
   d. The incentives to promote sustainable development that do exist in the current regime are too weak
   e. OTHER (please specify)

The remainder of the questionnaire will ask several questions about CO-BENEFITS. CO-BENEFITS are the additional and locally desirable benefits of measures designed to mitigate greenhouse gases (GHG). These benefits can range from improved local air quality to reduced traffic congestion to enhanced energy security.

3. Would the future climate change regime more successfully promote sustainable development if it recognised and rewarded co-benefits?

Yes	No

4. What would be the advantages of a future regime that recognises and rewards co-benefits? PLEASE CHECK ALL ANSWERS THAT APPLY

   a. Developing countries would more actively participate in the post-2012 regime
   b. Developing countries would receive due recognition for existing sustainable development policies
   c. Developing countries would have incentives to adopt policies that deliver co-benefits
   d. OTHER (please specify)

5. What would be the disadvantages of a future regime that recognises and rewards co-benefits? PLEASE CHECK ALL ANSWERS THAT APPLY

   a. Countries would be rewarded without committing to actual emission reductions
   b. Countries would be rewarded for adopting policies based on their own interest rather than a global interest
   c. Need for creation of additional institutional arrangements related to the measurement and monitoring of co-benefits
   d. OTHER (please specify)

6. Which agency should be held responsible for measuring co-benefits? PLEASE CHECK ONE

   a. An organisation under the UNFCCC
   b. An international organisation outside the UNFCCC
   c. An organisation in the host country government
   d. OTHER (please specify)

7. Which agency should be held responsible for monitoring the delivery of co-benefits? PLEASE CHECK ONE

   a. An organisation under the UNFCCC
   b. An international organisation outside the UNFCCC
   c. An organisation in the host country government
   d. OTHER (please specify)

8. Which institutional changes would be needed to reward co-benefits? PLEASE CHECK ONE

   a. The creation of "new" sustainable development credits
   b. The creation/ refinement of a rating system for policies that deliver co-benefits (i.e. the CDM Gold Standard)
   c. OTHER (please specify)

9. On what basis should co-benefits be rewarded?

   a. Based upon the actual delivery of co-benefits
   b. Based upon the presentation of potential co-benefits
   c. OTHER (please specify)

10. What incentives would produce the most significant improvements in the implementation of policies that deliver co-benefits? PLEASE CHECK ONE

   a. Financial assistance for sustainable development funds managed by an international organisation
   b. Financial assistance for sustainable development funds managed by the host government
   c. Financial assistance earmarked for specific climate-related needs in host countries (e.g. adaptation)
   d. Technical assistance to strengthen the capacity of host country's developmental agencies
   e. OTHER (please specify)

About IGES

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, biofuels, forest conservation, freshwater, waste and resources, capacity development and education. 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

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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