Chapter 3

Energy Security and Developmental Needs

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3.1 Introduction

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

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

3.1.1 Climate change, development and energy security (CDE)

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

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

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

3.1.2 Development and energy security issues in the current climate regime

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

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

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

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

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

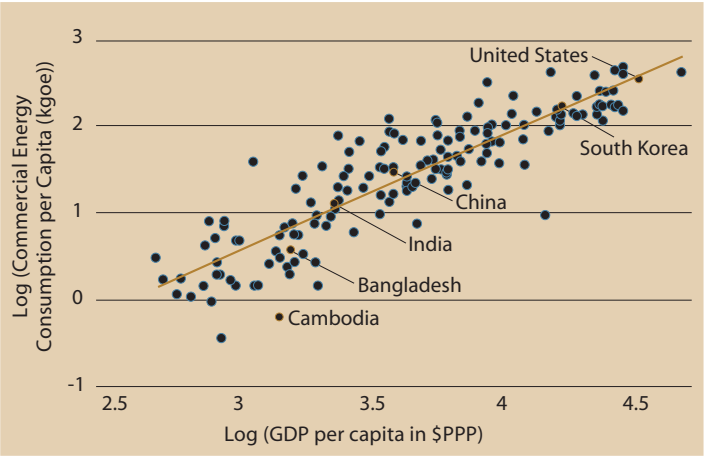
In many countries, there can be tension when trying to ensure energy supplies to meet growing energy needs while reducing the share of fossil fuels to mitigate climate change.

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

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

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

Figure 3.1 Correlation between energy consumption and GDP



Source: Modi et al. 2005

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

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

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

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

3.2.1 International context

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

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3.2.2 Asian context

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

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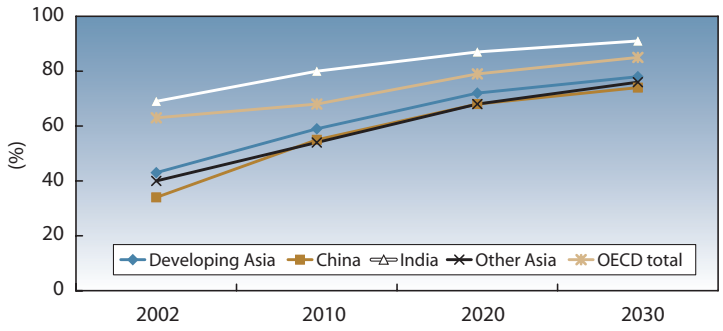
Asia has a huge appetite for energy to fuel such rapid economic development. Recent projections by IEA indicate that energy demand in Asia excluding Japan and Republic of Korea would grow at an average annual rate of 3.7% per year from 2003 to 2030 (the highest in the world). The increasing share of fossil fuels would mostly meet such high growth rate for energy. However, it must be noted that per capita energy consumption levels in Asia are still very low (around 60% of the world average) as compared with other regions of the world. Over the quarter of century, Asia's CO_2 emissions will most likely double from 8.9 Giga tonne (Gt) to 18.1Gt, with its share sharply increasing from 38% to 47% from 2002 to 2030 (IEA 2004). Although the region has abundant coal and natural gas reserves, the dependence on oil is likely to double from 43% to 78% by 2030 (Figure 3.2). Currently, the region accounts for 36% of the global primary oil demand. Developing Asia's oil demand in 2030 (40 million barrels per day - mb/d) is expected to exceed that of the USA and Canada combined (28 mb/d) (UNESCAP 2006). APERC (2006) projects that developing Asia will increasingly rely on foreign energy resources, particularly oils from middle eastern countries and that countries such as China, Indonesia, Malaysia, and Viet Nam will become net energy importers in 2030.

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

Figure 3.2. Future oil import dependence in Asian countries



Source: IEA 2004

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

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

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

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

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

Table 3.2 Access to electricity in various Asian countries

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

Source: IEA 2004

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

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

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

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

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

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

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					Energy Security (ES)	Develop-ment (DEV)	Climate Change (CC)
Brazilian proposal (UNFCCC-AGBM 1997) (Brazilian Ministry of Science and Technology 2000)	1990-2020	Historical responsibility	(1) Burden-sharing approach based on cumulative emissions and its impact on global temperature increase. (2) Establishment of the Clean Development Fund based on proceeds from non-compliance fee of US$10 per tCO_2eq from Annex I countries, of which 10 % is used for adaptation projects in developing countries.	Annex I countries are to reduce emissions by 30% below 1990 levels by 2020	0	+	+++
Contraction and Convergence (Meyer 2000)	40-100 years	Precautionary and equity principles (equal per capita entitlements)	(1) Specification of permissible level of global emissions at a safe level (no higher than 450 ppmv CO_2 eq) to establish a global emissions budget ("Contraction"). (2) Sharing of the emissions budget until per capita emissions converge by agreed year ("Convergence")	To stabilize atmospheric concentration of greenhouse gases (GHG) no higher than 450 ppmv CO_2 eq by 2100.	0	0	+++
Expanded "Common but Differentiated" (Gupta and Bhandari 1999)	Up to 2100	Equal per capita entitlements	(1) Before 2025: Developing country targets determined on carbon emissions per capita basis, allowing increased emissions in all developing countries except South Korea, Saudi Arabia, Singapore, and UAE. Developed countries given specific targets (e.g. a 5% reduction by 2010 and 25% reduction by 2025 from 1990 levels with adjustments based on a country's carbon intensity.) (2) After 2025, allocation is based on GHG emissions per capita (3) Convergence toward 0.5 to 0.75 tons of carbon emissions per capita	To stabilize atmospheric GHG concentrations at an agreed level (e.g. 550 ppmv CO_2 eq) over a long term period (e.g. 2100).	+	0	+++
Per capita allocation (Agarwal et al. 1999)	Up to 2100	Equal per capita entitlements	(1) Determination of an allowable level of global emissions ("emission budget") (2) Allocation of the budget per capita ("per capita entitlements") (3) Promotion of a zero carbon energy system, not the perpetuation of the current fossil fuel system. (4) Resources from emission trading to help reduce the cost of renewable energy technologies to a level that is competitive with fossil fuel technologies.	GHG concentration no higher than 400ppm	+	0	+++
Ability to Pay (Jacoby et al. 1999)	1990-2150	Capacity (Ability to pay)	(1) Setting long-term atmospheric constraint (2) Determination of short-term target based on simulation model (3) Differences in emission reduction obligations are related to differences in per capita income (4) Full implementation of international emission trading	long-term atmospheric stabilization (550ppmv by 2150)	0	+	+++

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

Table 3.3 (continued)

A2. Top-down approaches: Multiple Criteria

Proposals	Time Frame	Principle	Main Features	Target	Extent of consideration of the issues		
					ES	DEV	CC
Broadening the Climate Regime (Torvanger et al. 2005)	Up to 2100	Capacity Responsibility Development Governance	Differentiation of countries based on *when* (to take on commitments) and *what* (commitments to take on) (1) Capacity-Responsibility (CR) index defined as the sum of emissions per capita and GDP per capita (2) Human Development Index (HDI) (3) Governance Index (e.g. political stability, regulatory quality, and corruption) (4) Institutional affiliation index (e.g. members of OECD)	(1) 550 ppmv or 650 ppmv target (2) Stage 1 with no commitments, stage 2 with intensity target, and stage 3 with absolute emission reduction targets (proportional to per capita emissions)	+	+	++
Further Differentiation (Swedish Environmental Protection Agency 2002)	2013-2022	Wealth and opportunity to reduce emissions	Differentiation based on: (1) Opportunity (energy intensity) (2) Capacity (GDP per capita), and (3) Responsibility (historical, current or future emissions)	(1) binding and absolute (Developed countries) (2) binding indexed (Wealthier developing countries) (3) non binding (Least developing countries)	+	+	++
Global Triptych (Groenenberg et al. 2003)	2013-2020	Sectoral responsibility	The convergence of per capita emissions in three sectors: power, energy-intensive industries, domestic (residential and transportation). Differentiation based on (1) Energy efficiency level for power and industry sectors (2) GHG emissions per capita for household sectors	Absolute national targets 550 ppm atmospheric concentration	++	+	++
Keep it simple, stupid (KISS) (Gupta 2003)	Long-term (indefinite)	Ability Responsibility Vulnerability	Differentiation of countries into 12 categories based on three criteria: (1) GNP per capita (2) CO_2 emission per capita (3) Human Development Index (HDI)	Convergence on agreed per capita emissions: (1) Stabilization target (2) Reduction target (3) Limitation target	0	+	++
Soft Landing in Emissions Growth (Blanchard et al. 2001)	2010-2030	Ability Responsibility	Differentiation based on (1) ability to pay (per capita income) (2) causal responsibility (emissions per capita)	550 ppm by 2030 (1) Fixed binding national emission targets (2) Stabilization targets by different dates	0	+	++

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

B. Bottom-up approaches

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

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

Table 3.3 (continued)

B. Bottom-up approaches (continued)

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

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

Table 3.3 (continued)

C. Mixed approaches

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

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

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

3.4.1 Top-down approaches

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

3.4.2 Bottom-up approaches

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

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

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

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

3.4.3 Mixed approaches

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

3.4.4 Preliminary assessment of approaches

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

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

3.5 Perspectives of various stakeholders

3.5.1 Energy security

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

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

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

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

Some participants (e.g. China, India, and the Philippines) noted that developing countries have taken several measures for improving energy security through promotion of energy efficiency and renewable energy. China, for example, recently introduced the concept of the green GDP in its planning and is aiming for a "society of energy saving and environmental protection" with a circular economy, energy saving and the increased use of renewable energies. For example, the11th Five-year Plan of China set a national target to improve energy intensity by 20% and increase its fuel ethanol output by three times the current level by 2010 to reduce the country's dependence on imported oil and to boost the income of hundreds of millions of farmers. NDRC publicised energy efficiency data and criteria of all provinces in 2005 to incorporate an energy efficiency aspect into GDP growth (NDRC 2006). In response to this national plan, the Beijing government plans to reduce the share of energy consumption of coal to 65 million tones and increase the share of renewable energy from the current 1% to 4% in their 11th Five Year Energy Plan. Seven percent of India's power generation capacity is renewable, with about 5,500 megawatts of wind power installed, but it plans to increase the share of renewable sources in total power generation to 15% by 2032. Indonesia set a target for the share of energy from renewable sources (5% by 2020) in its national energy policy. However, several countries (e.g. Sri Lanka, Viet Nam) mentioned that insufficient financial and technological resources hindered the development of indigenous energy sources, and emphasised the need for considering differences in national circumstances including social and economic developmental status and sources of domestic primary energy. The energy security concerns in Asia can also be addressed partly through introducing policy options such as vehicle fuel efficiency standard, energy labeling of appliances, differentiated vehicle and fuel taxation to support the market for cleaner fuels and vehicles, and carbon tax (Asia Pacific Research Centre 2003, UNU-IAS 2006).

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

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

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

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

3.5.2 Developmental needs

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

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

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

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

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

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

3.5.3 Perspectives on the proposals for strengthening climate regime

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

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

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

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

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

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

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

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

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

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

3.6.1 Addressing energy security concerns in the future climate regime

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

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

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

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

Source: Adapted from Bernstein et al. (2003)

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

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

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

3.6.2 Addressing developmental concerns in the future climate regime

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

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

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

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

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

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

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

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

Another approach to integrate developmental issues in climate regime is to establish a clear interface between climate change and the Millennium Development Goals (MDGs). This approach is perhaps most appropriate for LDCs, as they remain the least preferred destinations for development-related investment under market-based mechanisms such as the CDM. The latest report on progress in achieving the MDGs in Asia-Pacific pointed out that whilst the region as a whole was on track to meet the large majority of MDG targets, the LDCs in the region were off track to achieve targets related to poverty alleviation, mortality improvement, forest cover, and CO_2 emissions per capita (UNESCAP et al. 2006). In global terms, the current GHG emissions from LDCs are practically negligible due to the low level of industrialisation, but for many Asian LDCs, the additional impacts of extreme events associated with climate change poses a fundamental challenge to their development objectives, including the achievement of the MDGs (Reid and Alam 2005).

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

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

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

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

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

Notes: MDG target 1 aims at halving population below US$ one per day. MDG target 9 aims at integration of development into national policies. CO_2 emissions per capita are one of the indicators for achieving target 9.

3.7 Concluding remarks

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

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

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