

## Special Focus

# Climate Change and East Asia: Challenges and Opportunities

### Introduction

On June 7<sup>th</sup>, 2005 the national science academies of the G8 nations plus Brazil, China and India, three of the largest greenhouse gas emitters in the developing world, signed a statement on the global response to climate change. The statement stressed that scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action. Greenhouse gas emissions are a global public “bad”, and as acknowledged by the World Bank mitigating the effects of climate change is critical in addressing the Bank's core objectives of poverty alleviation and sustainable development. The Intergovernmental Panel on Climate Change (IPCC) estimates that if atmospheric CO<sub>2</sub> concentrations were to double from pre-industrial levels, “developing countries would suffer economic costs of 5-9 percent of GDP<sup>1</sup>, several times higher than industrialized countries, and the poor in the Bank's borrowing countries would be at the greatest disadvantage.” Addressing climate change thus requires serious implementation efforts of global endeavors such as the United Nations Framework Convention on Climate Change (UNFCCC)<sup>2</sup> and national actions as well.

The East Asia and the Pacific region (EAP) is arguably the most diverse in the world in terms of climate change. While the region is still largely rural, most of its gross domestic product (GDP) and its mega cities, especially in China, are located on the coast – prime candidates to be impacted by sea level rise and weather related disasters. Many EAP countries are formed by

islands, and climate change is likely to significantly impact them. Some Pacific Island nations may even disappear. While climate change impacts on some EAP sectors are difficult to predict, climate change is likely to affect renewable natural resource - intensive or dependent sectors such as agriculture, forestry, and fisheries. As with other forms of pollution, the effect of greenhouse gas emissions is likely to be felt more acutely by EAP's poor, who are also more dependent on natural resources for their livelihood and more vulnerable. Yet, EAP countries also share part of the responsibility for worsening climate change. While most EAP nations contribute minimally to greenhouse gas emissions, the region's industrialized countries are at least in part to blame for the long run cumulative contribution to climate change. Moreover, the rapidly industrializing economies of the region are increasingly responsible for a significant share of current global emissions. While adaptation can assist in diminishing the impacts of climate change in EAP countries, unless mitigation is undertaken by large regional emitters their cumulative contribution to climate change will continue to increase in the future. It is thus difficult to perceive a solution to climate change without involving major East Asia and Oceania countries such as China, Japan, Republic of Korea, Indonesia, and Australia.

Since climate change science and policy are constantly evolving, climate change policy making is a learning process that needs to be flexible to incorporate new information. Nonetheless, global attention to climate change indicates a genuine concern about its impact, and the need for flexibility should not be a pretext for leniency. Given the potential catastrophic consequences, precaution is advisable even if standard tools of economic analysis may be biased against climate change related interventions. The purpose of this note is to provide a snapshot of the main climate change related issues of relevance to the region and the regional relevance in terms of climate change to the rest of the world.

### The Science

#### *Certainties and Uncertainties*

The cause of global warming has not been free of controversy. Global warming occurrence, humanity's contribution to it, and the extent of its likely consequences have been deeply disputed. Yet, as stated by Robert Watson, the World Bank's Chief Scientist: “... there is no

<sup>1</sup> From

[http://www4.worldbank.org/legal/legen\\_int/legen\\_climate.html](http://www4.worldbank.org/legal/legen_int/legen_climate.html)

<sup>2</sup> Over 160 countries have joined the UNFCCC aimed at confronting climate change. The Convention places the heaviest burden for fighting climate change on industrialized nations, since they, as a group, are by far the major source of past and current greenhouse gases (carbon dioxide, methane, nitrous oxide, and several other) emissions. These industrialized nations are listed in the UNFCCC's Annex I, which includes Japan, Australia, and New Zealand from the EAP region. The Kyoto Protocol, adopted in 1997, strengthens the Convention by committing Annex I Parties to individual, legally-binding targets, to limit or reduce their greenhouse gas (GHG) emissions. Only Parties to the UNFCCC that have also become Parties to the Kyoto Protocol (i.e. by ratifying, accepting, approving, or acceding to it) are bound by the Protocol's commitments. It should be noted that Australia, Croatia and the United States of America (USA) are the only Annex I countries that have not joined the Kyoto Protocol.

doubt the Earth's climate is warming, about 0.6 degrees Celsius over the last 100 years. Not only have we seen the land areas warm[er], but also the oceans, and both the satellite data and the land data are now both showing a warming. We have also seen changes in precipitation and sea level. The key question is whether the observed warming is due to human activities or whether it could be ascribed to natural phenomena. The Intergovernmental Panel on Climate Change (IPCC), in its last major report, said that most of the observed warming was, indeed, due to human activities...Therefore, the large majority of scientists do believe the Earth's climate is warming, and do believe that human activities are primarily responsible." According to the IPCC, at current trends in greenhouse gas emissions growth, global temperatures are expected to rise between 1.4 and 5.8° C (2.5 to 10.4° F) by 2100.

Such temperature changes are likely to have impacts on the sea level, precipitation patterns, water supply, ecosystems, and overall human development. In addition, higher climate variability may cause an increase in the frequency of extreme weather events and weather related disasters. As recent natural disasters and Figure 1 below in general illustrate, poor countries and the poorest people are most vulnerable to the impacts of climate change. If broken down by countries and over time, human contribution to global warming, however, has been very uneven. Since greenhouse gas emissions are largely the results of the combustion of fossil fuels (coal, oil, and gas), developed countries have traditionally been major contributors to global warming. Yet, several important questions remain: To what extent are natural disasters attributable to climate change? Is there a "point of no return" and, if so, how far are we from it? How much can we contribute to reverse the trend? These are key questions, but the current state of knowledge, coupled with the increased fear of a "climate surprise"<sup>3</sup>, underscores the need to incorporate the precautionary principle in policy making and is leading nations to increase efforts to mitigate global warming.

## Adaptation

### Impacts

EAP is one of the most vulnerable regions to climate change impacts. Due to its geography, it is one of the regions most at risk from natural disasters, both relative to its land area and the proportion of population affected. Since 1950, natural disasters have affected more than 3.4 million people and caused over 1,700 fatalities in the Pacific Islands alone. As Tables 1 and 2 indicate, the

economic and social impacts of disasters can be significant and long lasting.

While scientific information on a direct cause and effect relationship between certain natural disasters and climate change is evolving, the available evidence points towards the increasing frequency and intensity of extreme weather events in the region. In fact, 10 of the 15 most extreme events reported over the past half a century occurred in the last 15 years. Hurricane strength cyclones have increased systematically in the southwest Pacific, a trend also observed globally over the past 30 years (Bettencourt et al. 2006). In addition to more frequent and intense cyclones, the EAP region is also affected by a change in prevailing climate conditions. For example, compared to the past, the Central Equatorial Pacific is experiencing more intense rain (about a 30% change) and a hotter climate (0.6° C). Sea surface temperatures have increased by about 0.4 C (Hay et al. 2003). As the EAP region is also climatically diverse, the region is particularly vulnerable to multiple climate change impacts.

While the present path of development in EAP is placing more fixed infrastructures and economic activity within the coastal zone, this trend may offer limited scope for adjustments against the region's diverse climatic hazards such as floods, droughts, sea-level rise, and storm surges. The likelihood of damage to infrastructure and loss of human life because of unexpected extreme events will thus rise. Recent estimates indicate that a 1-5 meter sea level rise would impact the region's GDP between 1.7 and 8.3 percent, respectively. Countries most affected would be Vietnam (10.2-36.2 percent); China (2.4-10.8 percent), Indonesia (1.9-8.1 percent), Thailand (1.4-22.6 percent), and Cambodia (1.1-11.2 percent) (Buys et. al. forthcoming).

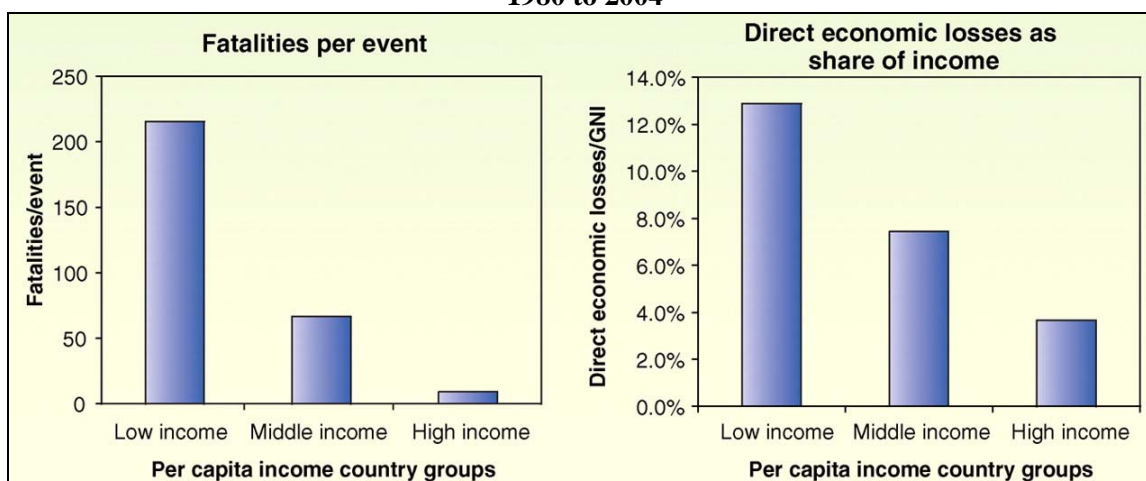
According to the IPCC (2001), the tropical areas of Southeast Asia are most vulnerable:

- Model-based projections of the mean annual number of people who would be flooded by coastal storm surges are of the order of 15 to 40 million in South East Asia for mid-range scenarios of a 40-cm sea level rise by the 2080s (Greenpeace 2005).
- The expected impact on agricultural productivity in tropical Asia due to temperature rises; increased sediment runoff of surface rivers; increased soil loss, land slips, and slides in EAP highlands; increased

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<sup>3</sup> A *climate surprise* is defined by the IPCC as a rapid, non-linear response of the climatic system to anthropogenic climate forcing (global warming). Climate surprises are low-probability, high-consequence extreme events, such as a rapid deglaciation of polar ice sheets.

**Figure 1. Fatalities per event and direct economic losses as % of Gross National Income. 1980 to 2004**



Source: Abstracted with permission from J. Linnerooth-Bayer et al., SCIENCE 309:1044-1046. Copyright [2005] AAAS.<sup>4</sup>

**Table1: Reported disasters in the Pacific Islands (1950 – 2004)**

	Number	Fatalities	Population affected	Reported Losses (2004 US\$M)
Windstorms	157	1,380	2,496,808	\$5,903.90
Droughts	10	0	629,580	\$137.00
Floods	8	40	246,644	\$94.80
Earthquakes	17	53	22,254	\$330.60
Others	15	274	21,520+	\$60,000
<b>TOTAL</b>	<b>207</b>	<b>1,747</b>	<b>3,417,006</b>	<b>\$6,526.30</b>

Source: Bettencourt et al. 2006

**Table 2: Estimated economic and social impact of disasters in selected Pacific Island countries (1950 – 2004)**

Country	Number of disasters reported	Reported losses in 2004 (US\$m)	Average population affected		Average impact on GDP	
			In disasters years	In all years	In disasters years	In all years
Fiji	38	\$1,174.6	10.8%	5.1%	7.7%	2.7%
Samoa	12	\$743.4	42.2%	6.1%	45.6%	6.6%
Vanuatu	37	\$384.4	15.5%	4.5%	30.0%	4.4%
Tonga	16	\$171.1	42.0%	5.3%	14.2%	1.8%
Guam	11	\$3,056.3	3.7%	0.5%	n/a	n/a

Source: Bettencourt et al. 2006

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frequency and intensity of typhoons, floods and droughts are all key sources of production losses (Kurukulasuriya and Rosenthal 2003). In the Philippines, the weather disasters mentioned were responsible for over 80% of the total rice losses from 1970 to 1990, costing up to US\$39.2 million in 1990 alone (Lansigan et al. 2000).

- Climate change impacts on ecosystems (including coral reefs) and on human health are also expected to be significant in South East Asia (IPCC 2001 and Greenpeace 2005).

### Measures

Given the long lifetime of atmospheric greenhouse gases, their stock will continue to accumulate for some time into the future regardless of international agreements for greenhouse gas emissions mitigation. This makes adaptation at the national level a necessity. Adaptation measures can be classified into two main categories: “no-regret actions” which are interventions that address current challenges independent from considerations on future climate change impacts; and “specific responses” to climate change impacts. No-regret actions are viewed as the best approach; since they are autonomous from climate change uncertainties as these influence little the net benefits from such actions. They can be clustered into the following:

- Disaster preparedness - Among the main policy lessons emerging from experience with disasters in recent years is the importance of integrating disaster prevention and natural disaster risk management as parts of development plans, poverty reduction strategies and investment projects. The most effective instruments for risk management of natural hazards are those that address current risks. The adverse consequences of storm surges, king tides, tsunamis and cyclones in the EAP region need to be addressed through hazard mapping, vulnerability assessments and assets-at-risk inventories. Coastal assets and infrastructure can be currently better protected rather than repaired after damage from extreme events. (Bettencourt et al. 2006). From an economic standpoint, risk management efforts have proven far more cost effective than repairing future damages. For example, the impact of cyclone Heta which hit Samoa in 2004 translated into 9% of GDP, compared with 230% of cyclone Val in 1991. Although the two cyclones are not directly comparable, as stated in Bettencourt et al. (2006): “the effects of cyclone Heta would have been far worse without an investment in risk management of natural hazards during the 1990s (World Bank 2004). Shoreline protection systems designed to cyclone standards performed well, with relatively minor damage, compared to sub-standard coastal protection in adjacent areas.”

**Table 3: Adaptation through Sectoral Measures**

<i>Adaptation Option</i>	<i>Purpose</i>	<i>Implications on climate change Adaptation</i>
Crops Diversification	Promoting farm-level risk management, increasing productivity, defending against pest/disease	In dry and temperate areas, the new crop mix may include new types of agriculture that require less water and are less vulnerable to high temperatures / water salinity.
Land and Water Conservation practices	Conserving soil moisture, prevent erosion, increasing production per unit of evapotranspiration, reducing run-off , etc.	In dry and temperate areas, water saving measures including small reservoirs can assure less variability in production during drought periods.  In tropical areas, land contouring and terracing can reduce run-off, preventing soil erosion and production losses.
Improvement of Agricultural Water Management	Increasing water efficiency and productivity, improving irrigation water distribution, etc.	In dry and temperate areas, agricultural water management can withstand rainwater shortages.
Modernization of farm operations and development of extension services	Improving means, awareness and knowledge of farmers to increase productivity.	In dry and temperate areas, the adoption of new irrigation technologies (drip and sprinkler) saves water.  Everywhere, on farm practices to cope with climate extremes can be taught to farmers.
Improving forecasting mechanisms	Assist planning	Forecasting of extreme weather events highly strengthens farmers’ ability to cope.

Source: adapted from Kurukulasuriya, P. and Rosenthal, S. 2003

- **Climate Proofing:** At the country level, climate change risks should be recognized alongside other risks that are routinely assessed. (Burton and van Aalst 2004). A recently published report by the Asian Development Bank provides “climate proofing” application case studies in different projects of Micronesia and Cook Islands (a road infrastructure project, a breakwater project, two projects for the protection of inland and coastal communities) and National Development Plans. (Hay et al. 2005).

While no-regret actions are the “low hanging fruits” of adaptation, when specific climate change impacts are certain – as in the case of sea level rise – targeted responses may be inevitable. Table 3 illustrates climate change adaptation through sectoral level actions. Most actions aiming at increasing water efficiency in agriculture, promoting soil conservation and enhancing productivity - hence contributing to poverty reduction - can offer protection against potential climate change impacts as well.

Regarding financing of adaptation measures, the Global Environment Fund (GEF) supports interventions that increase the resilience of countries and their vulnerable citizens, businesses, and ecosystems to adverse impacts of climate change. Ensuring the political will to include such adaptation measures into national development plans requires successful awareness based on local consultation and thorough data collection and analysis. Over the years, guidance on adaptation has evolved through a series of staged approaches. In order to facilitate a phased approach to adaptation, the GEF has helped countries to submit national communications to the UNFCCC, including national greenhouse gas inventories, vulnerability and adaptation assessments, and capacity building. Recently, GEF has begun moving into a second phase of supporting pilot and demonstration projects. These projects provide real benefits that have been useful for developing, testing, and institutionalizing rational approaches to local problems such as flooding, erosion and water scarcity.

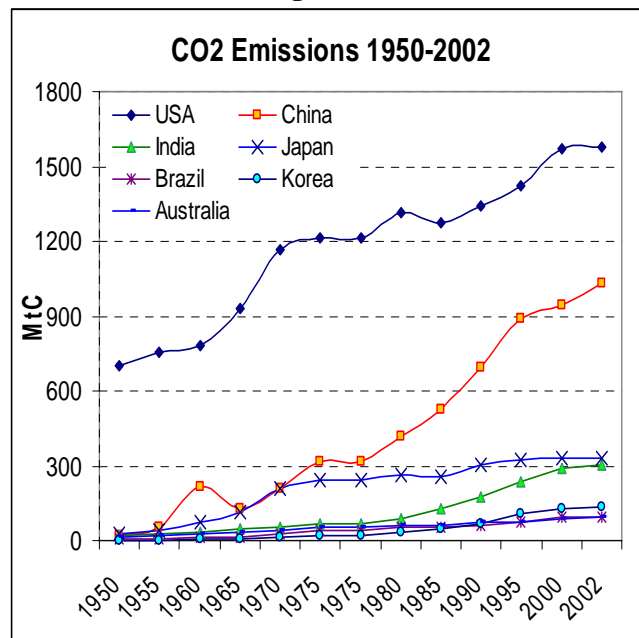
## Mitigation

### Impacts

Since climate change is related to cumulative greenhouse gas emissions, EAP countries, especially the industrialized ones, share part of the responsibility for the worsening of climate change. Moreover, since the region congregates large current global emitters, including from the developing world, the need for a mitigation effort in EAP is key. China, for example, is responsible for almost 15 % of the world’s total annual emissions (excluding land use change) and, as depicted in Figure 2, the gap between the country and the world’s largest emitter, the

USA, is rapidly closing. If compared to emissions from other large developing countries, China’s emission growth path is striking. Although China’s continuous increase in total CO2 emissions and other greenhouse gases during the last decade is debatable<sup>5</sup>, China has steadily ranked second in the greenhouse gas emitters list, almost triple the next East Asian country – Japan. In addition to China and Japan, Republic of Korea, Australia and Indonesia also figure among the 20 top emitters in total CO2 emissions.

**Figure 2**

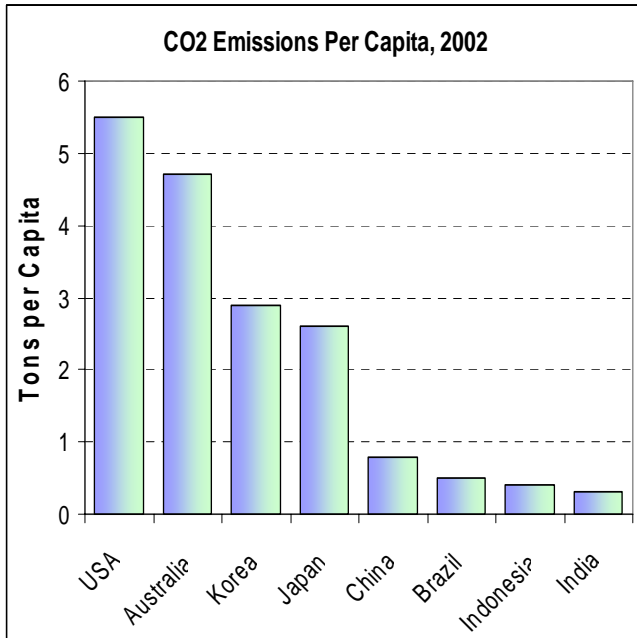


Of course, if the unit of accounting is greenhouse gas emissions per capita, given its large population, China’s world ranking falls considerably (ranked 97). As depicted in Figure 3, China’s per capita contribution to climate change in 2002 is well below some developed countries but still above other large developing economies.

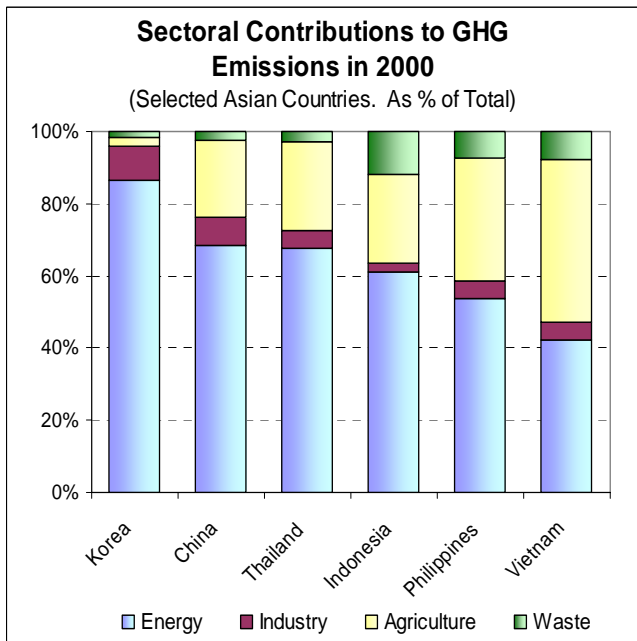
In terms of sectoral contributions to greenhouse gas emissions, as suggested by Figure 4 the energy sector, including transport and consumer electricity use, is by far the main contributor in most EAP large emitters. The energy sector contributes to over 70 percent of total emissions of large EAP emitters, indicating that energy efficiency and energy sources mix of these economies can be main drivers for total greenhouse gas emissions reduction in EAP. Slash-and-burn and other unsustainable agricultural practices also play an important role in other developing countries of the region.

<sup>5</sup> Streets et al. 2001 report a reduction in total CO2 and CH4 emissions in the period 1996/7 – 2000.

**Figure 3**



**Figure 4**



**Measures**

Greenhouse gas emission reductions can be achieved through national measures and internationally based measures.

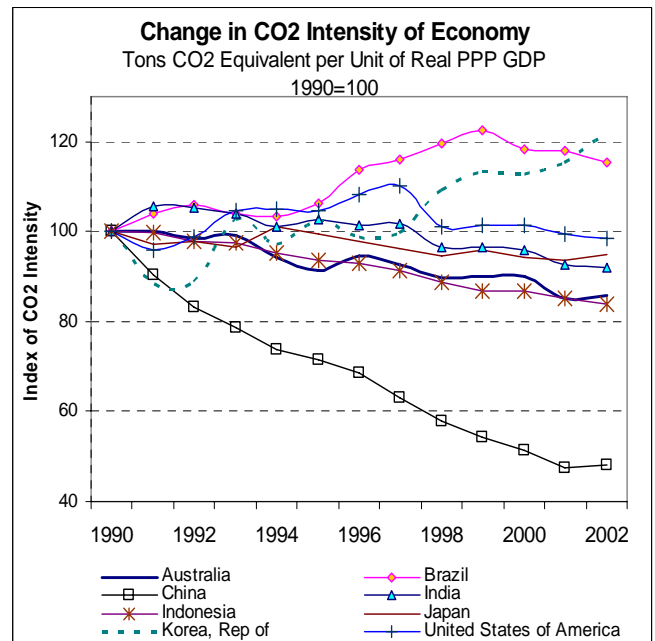
National Measures

There are a number of national measures that can be undertaken, which improve local pollution problems and contribute positively to greenhouse gas emissions reduction. China, for example, is engaging in several

ways from the highest planning tools (its 5 year plan) to actual measures on the ground.

While China's starting point was of a highly inefficient CO2 intensive economy, progress in a decade has been remarkable even as compared to other large emitters. The country's CO2 intensity has decreased by more than 50 percent as depicted in Figure 5. According to its national data, China seems to be acting effectively on energy demand through energy saving regulations, changes in energy subsidies and incentives structures.

**Figure 5**

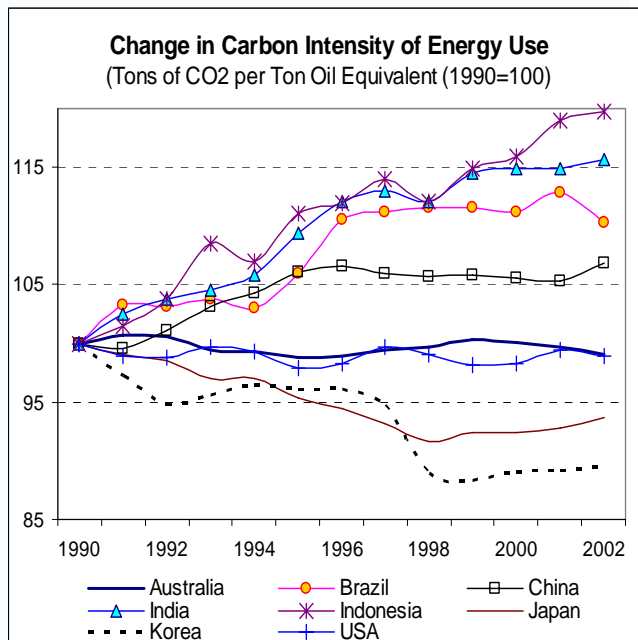


Yet, on the supply side the fossil fuel carbon intensity embedded in the energy sources mix is still reliant on highly polluting coal (between 60 and 70 percent). As illustrated by Figure 6, China's carbon intensity of energy use grew since 1990, reflecting a steady – or even increasing – coal centered energy mix (Zhang 2000). Nonetheless, China has:

- Enacted the March 2005 Renewable Energy Law which promotes the “greening” of China’s energy mix. Through a national renewable energy requirement, the law is expected to boost renewable energy use up to 60 GW or 10 percent in the next decade. If enforced, this law would be a breakthrough towards a cleaner energy mix, bringing about both a reduction in local pollution and a reduction in the energy supply risk through diversification (Feng Fei 2006).
- Promoted the closure of small, inefficient industrial plants; the improvement of energy end use efficiency and coal quality; the switching of many residential fuel users from coal to gas and electricity; and the promotion of technological progress in energy-intensive sectors (Streets et al. 2001).

China aims to reduce by 20 percent its energy use per unit of GDP by 2010, while increasing its GDP by four times with only twice as much energy use by 2020. Main drivers of these achievements would be a shift towards less energy intensive industrial sectors and regulation on the energy consumption standards in the building and transportation sectors, since the latter sectors are expected to gradually increase their relative contribution to total GDP against a decreased share of the industrial sector (Feng Fei, 2006). Moreover, completing energy price liberalization and raising energy taxes to reflect environmental costs, accelerating the adoption and domestic use of efficient energy production technologies, promoting environmentally-sustainable city designs and transport systems are but a few measures that China can take to further climate change mitigation while diminishing the impact of local pollution and securing additional economic gains.

**Figure 6**



While the actions planned or implemented by China provide some good examples to other countries of the region, the EAP region as a whole also has great potential for investing in hydropower and changing its dependency on intensive greenhouse gas emitting fuel sources. Beyond contributing towards higher energy security and diminishing local pollution, hydropower projects not involving large dam construction are also eligible investments under the Clean Development Mechanism (CDM) discussed below. EAP has significant hydropower potential. The region's hydropower contribution to electricity generation (20 percent in 2002) is lower than in all developing countries (26 percent) and in the world (22 percent). In 2003, China used 15 percent of the country's technically exploitable hydropower potential, while Indonesia, Malaysia, and Vietnam exploited 2.5 percent, 6 percent, and 19 percent of their technical potentials, respectively. As mentioned in World

Bank (2005): "By comparison, France, Japan, and the United States used 91 percent, 74 percent, and 51 percent of their technical hydro potential, respectively. With high electricity demand growth expected over the next decade, the aggressive development of hydropower could bring considerable environmental and economic rewards." As illustrated by China's current efforts and mentioned in the above report: "non-hydropower renewables present a similar prospect, albeit at a smaller scale, in EAP. They accounted for 1.3 percent of EAP's generated electricity in 2002 (0.6 percent in China) compared to 12.8 percent in the European Union and 2.1 percent globally. EAP countries have the opportunity today to lay the foundations for significant scale-up of renewable energy over the coming decades".

### Internationally Based Measures

The Kyoto Protocol which entered into force in 2005 commits industrialized (Annex I) country signatories to reduce in the period of 2008-2012 their greenhouse gas emissions by an average of 5.2 percent compared with their 1990 emissions. The Kyoto Protocol establishes several flexible "mechanisms" to help industrialized countries meet these commitments. Among these mechanisms, CDM is of particular relevance to developing countries<sup>6</sup>. CDM allows Annex I countries to invest in greenhouse gas emission reduction projects or carbon sinks (e.g. a reforestation project) in non Annex I countries and to claim the resulting Certified Emission Reductions (CER) from the investment. CDM offers important opportunities for climate change mitigation and sustainable development in EAP's developing countries. For example, the energy sector can benefit through the adoption of improved efficiency programs and renewable energy options. Programs to reduce greenhouse gas from industrial operations and methane emissions from urban landfills also qualify under the CDM. A number of governments and private companies have already entered the carbon market which is projected to grow rapidly in the coming years.

The World Bank's involvement in the carbon market can help developing countries establish the necessary institutions and procedures that allow public and private players to enter the market. The Bank can also help grow the market by linking private sector buyers of carbon credits with financially strapped climate-friendly projects in developing countries. In effect, carbon finance is becoming a significant contributor to environment-related project activities in EAP and the World Bank is assisting countries to better define their approaches to ownership and treatment of CERs under the CDM. To date, Emission Reductions Purchase Agreements (ERPAs) have been signed in diverse sectors including energy efficiency relating to cement production in

<sup>6</sup> Besides CDM, other mechanisms include *Joint Implementation* (JI) and *International Emissions Trading* (IET). Yet, these are less relevant to developing countries. See UNFCCC for a detail discussion (<http://unfccc.int/2860.php>).

Indonesia, wind and geothermal power in the Philippines, and hydroelectric power, coal mine methane, and the incineration of HFC-23 in China. Due to its size, the latter is described in Box 1.

### **Box 1: HFC-23 Reduction in China**

The unprecedented economic growth in China has been accompanied by a significant increase in greenhouse gas emissions, especially from industrial processes. One of the most potent greenhouse gases emitted in China is Trifluoromethane (HFC-23), a by-product released in the production of HCFC-22, which has 11,700 times the global warming potential of carbon dioxide measured in tons of carbon dioxide equivalent, or TCO<sub>2e</sub>. The China HFC-23 Emissions Reduction Project supports China's participation in global efforts to mitigate human-induced climate change. The project has led to the largest carbon finance transaction ever undertaken globally with the purchase of CERs, corresponding to approximately 18 million TCO<sub>2e</sub> per year through ERPA with two Chinese chemical manufacturing companies. The companies will install incineration facilities to destroy HFC-23 emissions using their own resources. The World Bank will aggregate funds of \$930 million to purchase the CERs generated by the project. Approximately 70 percent of this transaction will be financed by private capital. CER's large volume from the project will inject much-needed liquidity into the primary and secondary global carbon market which, before the project, stood at \$400 million, well below the projected level of \$20-30 billion that is eventually expected by 2012 from the market mechanisms for greenhouse gas reduction. China is planning to set aside a portion of the net revenues of this transaction in a "clean development fund" to promote climate change mitigation projects.

UNFCCC provides the main framework to addressing climate change at the global level. While developing countries do not have any obligations to reduce emissions under the Kyoto Protocol, EAP's main emitters are gradually becoming more active in international cooperation on greenhouse gas reductions through the Kyoto Protocol and otherwise. The recently announced Asia-Pacific Partnership on Clean Development and Climate is one such example bringing together Kyoto Protocol countries, Annex I non Kyoto Protocol parties and EAP main emitters. AP6 is an international non-treaty agreement between Australia, India, Japan, China, South Korea, and the United States launched on January 12 2006 at the Partnership's inaugural Ministerial meeting in Sydney. Foreign, Environment and Energy Ministers from partner countries agreed to co-operate on development and transfer of technology which enables reduction of greenhouse gas emissions. The agreement outlines "a ground-breaking

new model of private-public taskforces to address climate change, energy security and air pollution." Member countries of this endeavor account for around 50% of the world's greenhouse gas emissions, energy consumption, GDP and population. Unlike the Kyoto Protocol, this agreement allows member countries to individually set their goals for reducing emissions, with no mandatory enforcement mechanism.

As with adaptation measures GEF supports developing countries in their efforts to address climate change mitigation. GEF climate change mitigation projects fall under four categories: 1) elimination of barriers to energy efficiency and energy conservation; 2) adoption of renewable energy by reducing barriers and implementation costs; 3) reduction of the long-term costs of low greenhouse gas emitting energy technologies; and 4) support for the development of sustainable transport. GEF allocates and disburses globally about US \$ 250 million per year for climate change mitigation.

### **The Way Forward**

Climate change may have profound impacts both globally and regionally for EAP. The region's geographical and economic diversity imply that it will face a wide range of impacts. The region's GDP is likely to be significantly impacted by climate change, albeit in an uneven fashion among countries. As with other public "bads", the poor are more likely to be the most vulnerable to climate change. By definition, climate change is not equitable, and regardless of uncertainties countries may be better served by taking a precautionary stand in climate change related issues. A host of actions to adapt and mitigate climate change can be taken which are cost effective and make economic and environmental sense. The good news is that the region is increasingly aware of climate change and is taking action both nationally and globally. Yet, there are still many more opportunities for implementing measures that are economically sensible, improve the local environment, and contribute to the global common good. Countries in East Asia and the Pacific must do much more; the stakes are very high.

This Special Focus was prepared by Dan Biller and William Nicholas Bowden of the World Bank's East Asia and Pacific Region Environment & Social Development Sector Department and Gretel Gambarelli of the World Bank's Agriculture & Rural Development Department (ARD). Comments from Homi Kharas, Julien Labonne, Neeraj Prasad, Maria Teresa Serra and David Wheeler are gratefully acknowledged. Except where noted, figures are based on data from the Climate Analysis Indicators Tool (CAIT). Senior authorship is not assigned.

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