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TOWARD CLEAN SHARED GROWTH IN ASIA

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The environmental problems of developing Asia are now well documented. The combination of rapid urban–industrial growth and *de facto* 'grow now and clean up later' environmental strategies have resulted in low energy efficiency within industry, natural resource depletion, materials-intensive production, polluted rivers and groundwater supplies and unhealthy air in many Asian cities. According to the Asian Development Bank (ADB 1997), average levels of air particulates in Asia over the period 1991–95 were approximately fivefold higher than in OECD (Organisation for Economic Co-operation and Development) countries and twice the world average (see Table 1.1). Measures of water pollution, such as biochemical oxygen demand (BOD) levels and levels of suspended solids, were also substantially above world averages. Prior to the current crisis,

Table 1.1 **Environmental conditions in Asia, average 1991–95**

Source: Lohani 1998

	Asia	*Africa*	*Latin America*	*OECD*	*World*
Air pollution					
Particulates (mg/m^3)	248	29	40	49	126
SO_2 (mg/m^3)	0.023	0.015	0.014	0.068	0.059
Water pollution					
Suspended solids (mg/l)	638	224	97	20	151
BOD levels (mg/l)	4.8	4.3	1.6	3.2	3.5

energy demand in Asia was doubling every 12 years and demand for electricity was growing two to three times faster than gross domestic product (GDP), resulting in major increases in greenhouse gas emissions.

Important efforts to address many of these environmental problems are currently under way within the region. Over the past ten years, greater resources have been committed to pollution control and to the remediation of existing pollution. Investments have also been made in urban infrastructure, particularly in water supply and sanitation systems, and, to a lesser extent, in mass transit systems. In addition, environmental regulatory systems are being strengthened in a majority of countries within the region. There is also a variety of initiatives under way in many East Asian countries which use market-based instruments, information disclosure, public participation, clean-technology diffusion and other innovative policy approaches. Although actual results vary widely from country to country, evidence suggests that enhancements in regulatory activity are yielding important incremental improvements in the environmental performance of industrial firms within the region (O'Connor 1994; Rock 1996b; USAEP 1997; Vincent 1993; World Bank 1999).

What these regulatory initiatives have not done is change the basic structural relationship between urban–industrial growth and the environment, and the attendant trajectory of increased energy and materials use, pollution and resource depletion. Indeed, environmental policy as we know it today—in Asia and in the rest of the world—is not directed towards such a transformative goal. Born of the concerns and expectations of OECD economies in the 1960s and 1970s (such as improving local and national environmental quality, minimising health and safety risks and reducing pollution from a mature urban–industrial capital stock), environmental policy is only beginning to come to terms with the global sustainability challenge. To be sure, there have been a multitude of important innovations in environmental regulatory approaches and policy instruments, as well as increased efforts to tailor regulatory approaches to local economic, social and political conditions. But the core focus of environmental policy for industry continues to be that of reducing negative environmental 'outputs' (such as pollution and waste) and on improving local environmental 'outcomes' (such as air and water quality). What the growing body of scientific evidence on deforestation, climate change and resource depletion has taught us, however, is that the sustainability challenge goes beyond pollution and declining local environmental quality to human-induced degradation of the biosphere. Although current environmental policy yields incremental improvements in energy and materials efficiency (as a means of reducing pollution and improving local environmental quality), these plant-level improvements are typically overridden by the scale effects of energy—and materials—intensive economic development.

Nowhere in the world is the challenge of 'changing course'—of shifting to patterns of economic development that are less intensive in use of energy and materials and in production of pollution and waste—more urgent than in the rapidly industrialising economies of Asia. Most of Asia is in the midst, not at the end, of an urban–industrial-led development transition unparalleled in its scale and intensity. Gross national product (GNP) per capita in East Asia has grown at an average annual rate of 5.5% over the past

30 years, or more than twice the rate of the OECD economies (World Bank 1998a). This has in many ways been a development triumph, reducing poverty and improving life expectancy within the region. But the average GNP per capita of Indonesia, Malaysia, the Philippines and Thailand (the so-called second-tier newly industrialised countries [NICs]) in 1996 was still a modest $2,392, or approximately one-tenth of that in the high-income OECD economies. On average, roughly half of the workforce in these four countries in 1990 was still employed in agriculture. Six out of ten people live outside of urban areas.

Future increases in per capita income within the region will almost certainly entail continuing massive shifts in economic structure, from agriculture into industry and from rural areas into cities. What this is likely to result in is the largest increase in urban population in human history. By one estimate, the urban population in the East Asian NICs, including China, will increase from about 550 million in 1995 to almost 1.2 billion in 2025 (WRI 1997). Asia's share of global output, which was roughly 10% in 1950 and 30% in 1995, is expected to reach 55%–60% by 2025 (Radelet and Sachs 1997: 46). The rate of growth may be in doubt; the direction of change is not.

In the absence of new policy interventions, the likely impacts of such large-scale industrial and urban growth in Asia over the next 30 years are also reasonably predictable. Even with substantial improvements in environmental regulation and a significant shift toward cleaner technology within the region, the ADB (1997) predicts declining environmental quality under a 'business-as-usual' scenario in the lower-income countries of South-East Asia, such as Indonesia and the Philippines, and South Asia. This conclusion is also shared by projections for air quality from the World Bank (1997d). Recent work suggests a similar finding for energy consumption. For example, Carmichael and Rowland (1998) project that current pollution prevention programmes, if widely implemented in Asia, have the potential to yield a 30% improvement in energy efficiency of economic activity by 2020. But, even if such efficiency improvements are achieved, energy usage and attendant greenhouse gas emissions will still double over this time-period (Carmichael and Rowland 1998). Asia is predicted to overtake the OECD economies as the largest source of greenhouse gas emissions worldwide sometime between 2015 and 2020.

It is this shadow of the future—the large-scale increase in urban and industrial activity in Asia forecast for the next three decades—that demands a new policy response. Given the very likely continuing major shift from agriculture to industry, and from rural areas into cities, the critical challenge in Asia is to reduce substantially the energy, materials, pollution and waste intensity of urban–industrial activity in ways that support continued improvement in socioeconomic welfare. This is the challenge of clean shared growth in Asia. Our goal in this book is to lay out a policy framework to address this challenge, that is, to turn the trajectory of future urban and industrial activity in Asia toward patterns of development that are less intensive in terms of use of energy and materials and production of pollution and waste in a dynamic of continuous improvement and superior performance.

Growth in East Asia over the past three decades has been tightly linked to the increasing globalisation of the world economy. Trade and export-oriented industrial-

isation have been at the leading edge of the development model pursued within the region. Foreign direct investment by multinational corporations as well as portfolio investment from both Asia and the OECD have been important drivers of economic growth (Dua and Esty 1997). More generally, East Asia has benefited from intensified international flows of information and technology. Development in the region is increasingly influenced by cultural processes operating on an international scale, ranging from norms of consumption to concepts of governance and business management. In this context, efforts to develop a policy framework for clean shared growth inevitably confront the structure of the contemporary global political economy and the attendant opportunities for, and limits to, policy intervention. Specifically, what are the implications of economic globalisation for the strategies that might be pursued in East Asia and elsewhere to promote improvements in socioeconomic welfare and the environment?

Held *et al.* (1999) identify three broad schools of thought regarding globalisation. The first school, labelled 'hyperglobalist', recognises in globalisation the emergence of a new economic age in which the historic role of nation-states is superseded by a new order of global governance, economy and civil society. In its neoliberal form, the hyperglobalist thesis identifies increasing trade and economic integration worldwide as a key driver of improvement in socioeconomic welfare. For neo-Marxists, these same processes of economic integration lead to inequality and environmental degradation rather than clean shared growth (Greider 1997). The second school of thought, labelled by Held *et al.* (1999) the 'sceptics', argues that the claims of a new global economy are grossly exaggerated and that the level of global economic integration today is actually less than that observed during the late 19th century. Although there has been a trend toward increasing international trade and investment over the past 50 years, this has been associated predominantly with the growth of regional trading blocs (North America, Asia–Pacific and Europe) rather than with a truly global economy (Boyer and Drache 1996; Hirst and Thompson 1996). By this account, the power of nation-states is changing but is not necessarily diminished, often working indirectly through the influence of powerful governments on regional and international organisations, such as the North American Free Trade Agreement (NAFTA) and the International Monetary Fund (IMF).

The third school of thought is labelled 'transformationalist' (Held *et al.* 1999), and it is this set of ideas that comes closest to our own analysis of the dynamics of the global economy today. Contrary to the views of sceptics, the transformationalist thesis recognises in globalisation a powerful set of economic, cultural and social forces that are indeed restructuring economies and societies around the world, and the attendant opportunities for policy intervention in support of improved socioeconomic welfare and reduced environmental degradation. At the core of the globalisation dynamic is the intensification and geographical extension of economic, social and cultural linkages (Dicken 1998). The medium of these linkages ranges from information flows to international capital investments, media images to organisational partnerships, but contrary to the views of hyperglobalists the outcome of these processes of interconnection and interlinkage are essentially contingent, neither necessarily positive nor necessarily negative with respect to socioeconomic welfare and the environment in different parts of the world. Specific outcomes are open to the influence of public and private

policy, of governance systems and of public participation at a wide variety of scales, from that of the individual community to national government policies and the actions of regional and international organisations such as Asia–Pacific Economic Co-operation (APEC), Association of South-East Asian Nations (ASEAN), and the World Trade Organisation (WTO). By this account, globalisation constitutes a range of powerful forces that can potentially be directed to particular societal goals through the development of appropriate policies and governance structures. The challenge is to identify the forms of intervention at different geographical scales that support improvements in socio-economic welfare and the environment and to promote the successful articulation of policies pursued with communities, regions, national governments and regional and international organisations.

It is on this basis that we approach the challenge of clean shared growth in Asia. The policy framework we propose draws on four core themes. First, addressing the challenge of clean shared growth requires harnessing the powerful forces of economic and social change at work within the global economy today. Intensified flows of investment, technology and information, as well as the increasing interconnectedness of producers and consumers, manufacturers and suppliers, and firms and investors, present significant policy opportunities for turning the trajectory of urban–industrial development in rapidly industrialising and urbanising Asia. The greater availability and ease of access of information worldwide, for example, provides a significant opportunity for impacting the environmental performance of industry. But the likely impact of information availability depends in part on the development of low-cost, standardised, transparent and verifiable systems of environmental performance measurement at the scale of the factory, industry and industrial sector. Similarly, the likely impacts of intensified flows of technology worldwide on economic development and the environment depend in part on the ability of firms and regions to use, adapt and enhance such technologies effectively.

Second, the sustainability challenge facing rapidly industrialising Asia today is qualitatively different from the environmental concerns that underlay the emergence of mature environmental regulatory systems within OECD economies during the 1960s and 1970s. The context within which regulatory systems must operate diverges in important ways even among Asian economies. Understanding this context is critical to successful policy intervention. Accordingly, policy development must begin by identifying the economic, political and social conditions in Asia and the world that constitute the structure of the sustainability challenge and the attendant opportunities for change. Foremost among these conditions is the anticipated future expansion in urban and industrial activity and the need to shape this trajectory of future economic development. In addition, the policy response must reflect the profoundly globalised character of many economic and social processes in Asia today, from investment and trade, to sources of information and technology, and locations of end-user markets.

Third, given that future increases in per capita income in much of Asia will almost certainly entail major shifts from agriculture into industry, and from rural areas into cities, the key policy focus must be on substantially reducing the energy, materials, pollution and waste intensity of urban–industrial activity. Reductions in energy, mate-

rials, pollution and waste intensity must continuously offset ongoing expansion in urban and industrial activity (Rock *et al.* 1999a). This probably requires improvements that go well beyond what is required to meet baseline local environmental and health needs and beyond the improvements achieved through existing environmental regulatory approaches. And, because the sustainability challenge in Asia includes such global concerns as greenhouse gas emissions and resource depletion, it is imperative that the policy approach address the actual use of energy and materials (i.e. intensity of use) and not just ameliorate the pollution and waste by-products ofurban–industrial activity. Framed in these terms, the policy focus necessarily moves beyond controlling pollution to influencing basic processes of investment, technology change and market development, or what we call the 'denominator' of economic activity.

Fourth, we argue that the focus on intensity, and on the urban–industrial process itself, expands the range of drivers and points of entry that can be harnessed to the goal of improved environmental performance. The array of possible drivers of improved environmental performance is wide, from community pressure to market demand, supplier relations, international agreements and environmental regulation. Effective environmental regulation will be crucial to success. But, within the policy domain, shaping the energy and materials intensity of urban–industrial activity is as much an issue of technology, trade, urban and industrial policy as it is of environmental policy *per se*. The openness of East Asian economies to trade, investment and technology, and the increasing globalisation of markets and information flows, suggest that these economic processes are potentially powerful drivers of improved environmental performance. Public policy has a key role to play in bringing these drivers to bear on the investment and technology decisions of private industry, in fostering a clear economic and environmental performance orientation among firms that promote a dynamic of continuous improvement, and by fostering systems of civic ordering (e.g. public–private partnerships) and private ordering (e.g. management cultures) that support these goals.

The context for clean shared growth in Asia today

How can public policy best address the challenge of clean shared growth in developing Asia today? The most common response to this question has been to look to the environmental regulatory systems of the United States and other OECD economies as potential models for policy intervention. There is certainly much to be gained from the OECD experience, as evidenced by the progress made over the past three decades in reducing industrial pollution and improving environmental quality within these economies. But there are at least two reasons to suppose that a broader frame of reference will be valuable. First, regulatory approaches within the OECD are themselves undergoing a process of reassessment and change (OECD 1997). This re-evaluation is linked to a growing interest in the role that civil society, information, the corporate sector, technology innovation and markets can play as drivers of improved environmental performance (see e.g. Davies and Mazurek 1996; Heaton and Banks 1997). Second, the

environmental problems and concerns, and the economic, social and political context within which environmental policy was developed within the OECD economies in the 1960s and 1970s are very different from those of developing Asia today (a partial list of these differences would include levels of foreign direct investment, external trade, scale of urban areas, rate of industrial growth and effectiveness of legal systems). To take but one example, whereas the OECD economies had a relatively mature urban–industrial capital stock and infrastructure, developing Asia is in the midst of very rapid urban–industrial growth. The economic and political context has profound implications for the policy response.

Our analysis begins with the character of the development process in East Asia today, and the global economic, political and technological context within which that development is taking place. Our comments are necessarily broad, for in some instances there is as much variation within the developing economies of East Asia as there is between East Asia and the OECD. Our key focus is on the developing economies of South-East Asia, but, as we show below, the challenge and the opportunity of clean shared growth in Asia entails a set of structural characteristics that have broad significance within the region.

Industrial-led development

First, industrialisation and technology catch-up are central elements of the development model that brought rapid shared growth to the economies of East Asia.[1] Typically, development involved a shift from agriculture into labour-intensive and resource-intensive industries, in the first instance, and then into more knowledge-intensive and technology-intensive industries, such as electronics, as well as producer services. As shown in Table 1.2, the structure of output varies considerably across Asian economies with the contribution of agriculture to GDP decreasing over the period 1980–96 for many low-income economies in South-East and South Asia. Two consequences follow for our analysis. First, because much of Asia seeks to emulate the model of development pursued by the first-tier Asian NICs, rapid industrialisation will undoubtedly remain at the core of the sustainability challenge within the region. Second, because the development model pursued by the Asian NICs depends on technology catch-up and the cultivation of local innovation capability, influencing the pattern of technology investment and change is a key opportunity for policy intervention.

Past and future growth

As shown in Table 1.3, many of the rapidly industrialising economies of East Asia achieved remarkable rates of growth in GDP per capita over the period 1965–96. But, even with this growth, most low-income countries in Asia, including the second-tier East Asian NICs (Indonesia, Malaysia, the Philippines and Thailand), are still in the early stages of a

1 This is not to denigrate the importance of intensification of agriculture or of massive investments in basic education, healthcare, infrastructure and family planning to the success of the East Asian shared growth model.

	Agriculture		*Industry*		*Manufacturing**		*Services*	
	1980	1996	1980	1996	1980	1996	1980	1996
South Asia	38	28	25	28	17	19	37	44
EastAsia	28	20	44	44	32	33	28	36
China	30	21	49	48	41	38	21	31
Indonesia	38	28	26	29	18	20	36	43
Korea	15	6	40	43	29	26	45	51
Malaysia	22	13	38	46	21	34	40	41
Philippines	25	21	39	32	26	23	36	47
Singapore	1	0	38	36	29	26	61	64
Thailand	23	11	29	40	22	29	48	50

** Industry includes manufacturing which is also reported as a separate category.*

Table 1.2 **Structure of economic output(% of GDP) for selected countries, 1980 and 1996**

Source: World Bank 1998d

Table 1.3 **Growth in GNP per capita,1965–96: average annual growth (%)**

Source: World Bank 1998d

South Asia	2.2
East Asia	5.5
China	6.7
Indonesia	4.6
Korea	7.3
Malaysia	4.1
Philippines	0.9
Singapore	6.3
Thailand	5.0

profound urban–industrial development transition. Most of the industrial stock that will be in place 25 years from now is not on the ground today.[2] What this means in practice is that the first three decades of the 21st century will likely witness the most prodigious expansion of urban–industrial activity in Asia in the history of the world. This is both a threat to sustainability and an opportunity to shape, at an early stage, the energy, materials, pollution and waste intensity of new urban–industrial investment. If actions are taken now there is a once-in-a-country's-lifetime opportunity to achieve a more sustainable growth trajectory. This opportunity is significantly different from that faced by the OECD countries when they launched their environmental programmes in the 1970s. Then the problem was not how to make the new urban–industrial capital stock cleaner but rather how to retrofit a large existing capital stock with end-of-pipe controls to reduce emissions after they were produced.

Private industry

The development process in Asia today is driven overwhelmingly by private capital. As of the mid-1990s, public investment (largely development assistance) constituted only 10% of new capital flows in East Asia. Of the dominant private investment, approximately 50% was foreign direct investment by international business. The implication is clear. Achieving clean shared growth depends on greening the new investment and technology choices of private business. Public policy must focus on promoting conditions under which such greening will take place. The prospects for such policy intervention may never have been better. Many leading companies are undergoing an unprecedented reassessment of their own role in a sustainability transition (Fischer and Schot 1993; Graedel and Allenby 1995; IHDP 1999; Roome 1998; Socolow *et al.* 1994). Sometimes this takes the form of the greening of supply chains and the identification of win–win opportunities in economic and environmental policies, including those affecting technological change and openness to the world economy (Heaton and Banks 1997; Wheeler and Martin 1992). Sometimes it takes the form of new international voluntary environmental management standards and private law models of environmental regulation, such as the ISO 14000 series, or of industry codes of conduct (as in the chemical industry's 'Responsible Care' programme) (Roht-Arriaza 1995). And sometimes it takes the form of corporate disclosure and accountability (as in the rapid growth of corporate environmental reporting and green accounting).

Latecomer status

As O'Connor (1994) has noted, the latecomer status of Asian NICs within the global economy is an important context for policy response. This is particularly the case with

2 In a pre-crisis study of Indonesia, the World Bank (1994a) projected that 85% of capital stock that would be in place by 2020 is not in place today. Even with the current recession and slower and delayed growth, the significance of new investment remains. At an annual growth rate of manufacturing output of 7.25% (just half the growth rate maintained during the 1990s prior to the crisis), manufacturing output doubles every ten years.

respect to technology, where Asian NICs have access to an array of environmentally advanced technologies developed within OECD economies. There is now considerable evidence that newer plant and equipment developed mostly within the OECD economies tends to be or can be made cleaner than existing plant and equipment (Arora and Cason 1995; Christensen *et al.* 1995; Nelson 1994; Wheeler and Martin 1992). This means that it is now, or soon will be, technically and economically possible for manufacturers in the NICs to import, adopt, adapt, modify and innovate on an industrial capital stock that will tend to be cleaner simply because it is newer.[3] The policy challenge is to promote the selection and use of such clean technology in new urban and industrial investment. Since the majority of technology design and development remains centred with OECD economies, technology policy in the OECD will be crucial to clean shared growth in Asia and indeed around the world. To repeat, the critical technology is not that of end-of-pipe pollution control, but new and improved product and process technologies that are designed to achieve higher efficiencies in energy and materials use.

Urban-based growth

Industrialisation in East Asia has been closely allied with highly concentrated urban growth. The Bangkok region, for example, accounts for almost one-half of Thailand's GDP and a little more than 75% of manufacturing value added (World Bank 1994b: 8). Four cities on Java (Jakarta, Suraya, Bandung and Semarang) account for 36% of Java's and 27% of Indonesia's industrial output (World Bank 1994b: 75). As a consequence, much of East Asia's industrial pollution is concentrated in urban areas. This means that efforts to address industrial pollution need to be framed in the context of addressing allied urban environmental problems. It also means that urban governance, land-use control and urban infrastructure investments are likely to be important elements of the policy response. As shown in Figure 1.1, many Asian countries are predicted to experience very large increases in urban population over the first three decades of this century. The total urban population of the East Asian NICs, including China, is expected to approximately double by the year 2025 to almost 1.2 billion people (WRI 1997).

Globalisation

The shared growth miracles of Asia occurred in tandem with rising openness to trade and investment within the world economy. As shown in Table 1.4, trade as a percentage of GDP increased substantially in East Asia between 1970 and 1996. In broad terms, open economies increase the interdependence of Asia and the global economy at large, whether this be in terms of market demand, investment and technology supply or the global impacts of economic change (such as climate change). Open economies are

3 We do not, however, have good data on the extent to which manufacturers are availing themselves of cleaner technology within South-East Asia. As most existing policy presumes a 20%–30% improvement in energy and materials efficiency simply through the use of newer, cleaner technology, this becomes a critical policy issue.

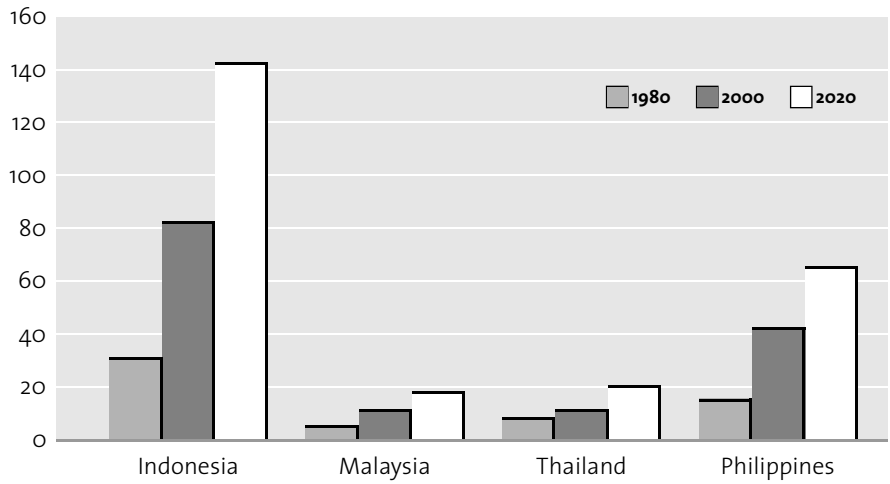


Figure 1.1 **Urban population (in millions)**

Source: WRI 1997

Table 1.4 **Trade as percentage of GDP, 1970 and 1996**

Source: World Bank 1998d

	1970	*1996*	
South Asia	14	30	
EastAsia	17	58	
China	5	40	
Indonesia	8	27	
Korea	37	69	
Malaysia	80	183	
Philippines	43	94	
Singapore	232	356	
Thailand	34	83	

already exposing manufacturers in the NICs to an increasingly wide range of pro-environmental market pressures. Because the shared growth miracles in East Asia are predicated on the export of manufactures to countries in the OECD, these external market pressures will only increase over time. In our view, successful developing-country exporters of manufactures will learn and are learning to meet environmental market requirements the same way they learned to meet developed-country buyers' requirements for on-time delivery, quality and packaging requirements (Keesing 1988). At the same time, the importance of international investment, and of multinational corporations, to the development process in Asia today creates an additional point of entry for addressing environmental performance. There is growing evidence that both local and international financial institutions operating in developing countries and capital (stock) markets in developing countries operate in ways that either reward or punish firms for their environmental behaviours. Environmental due diligence in lending is an increasingly common practice in Asia.

Governance and civil society

Despite strong pressures toward global convergence, there remain substantial differences between South-East Asian societies and countries such as the United States in many dimensions of governance and civil society, ranging from the strength of legal systems, to traditions of strong public policy planning (as in the industrial and technological planning pursued by the first-tier NICs), to the role of regional governance systems (such as ASEAN and APEC), to the presence of non-governmental organisations (NGOs) and transparency in financial transactions. It is also within these areas of governance structure that there is the greatest variation among countries within South-East Asia. Public policy must recognise and respond to these differences and to the specific social and political context of individual countries.

Having said this, there are several general trends that are likely to be of importance for policy intervention. As in other parts of the world, the growing availability of information and the growth of NGOs is creating a new force within governance structures of Asia. To varying degrees in each of the NICs, citizens, communities and organised groups in civil society are placing increased pressure on governments and private sectors to improve environmental quality. In some places, such as Indonesia, public-sector environmental agencies are taking advantage of public and community pressure to devise low-cost enforcement strategies that take advantage of the concern of firms for their (environmental) reputations. In our assessment, achieving clean shared growth will depend in part on the ability of Asian countries to harness these processes of private and civic ordering.

Economic crisis

Jointly, the above seven elements (industrial-led development, future growth, private capital, latecomer advantages, concentrated urbanisation, globalisation and governance)

define the critical context within which a policy response must be developed to meet the challenge of clean shared growth in Asia. But no analysis of context would be complete without reference to the economic and fiscal crisis that dominated the region at the end of the 1990s.

To begin with, it is important to note that the effects of the crisis and the prospects for a return to past patterns of rapid growth vary widely within the region. Thailand, Indonesia and South Korea were hardest hit and experienced a substantial real contraction in output. Per capita income in Indonesia, for example, fell from approximately US$1,100 per capita in 1996 to US$460 per capita in 1998. Malaysia and the Philippines were also hard hit. The economies of Singapore, Taiwan and China have not experienced the freefall in output visible elsewhere (World Bank 1998a).

The immediate environmental effects of the economic crisis included cutbacks in regulatory activity, delayed investments in new technology and reductions in overall levels of economic activity and attendant pollution (Afsah 1998; World Bank 1998a). The crisis will probably also affect the sectoral composition of economies, especially in the lower-income countries of South-East Asia. Most manufacturing industries with a high import content have suffered from deteriorating exchange rates and a slowdown in export opportunities. Industries with high local content, such as natural resource-based industries, will probably increase in importance in the short term.

It is also possible that the economic crisis will trigger more broadly ranging changes in policy practices and patterns of development. Attention has focused in this regard on two particular themes, namely, disclosure/transparency and commitments to an open economy. In the aftermath of the crisis, many observers voiced support for a partial retreat from the growing openness of trade and investment within the region (Lim 1998). Certainly, the volatility of capital flows, especially debt flows, in East Asia intensified the crisis. The World Bank (1998a) reports that in the space of one year net capital flows reversed by more than US$100 billion, but as yet there has been little evidence of a broad withdrawal from open economies. Indeed, for most Asian NICs, export growth remains a key strategy for recovery from the crisis, albeit dependent on economic recovery in Japan and continued economic growth in North America and Europe. In addition, foreign direct investment exhibits less short-term volatility than other forms of international private capital investment.

We conclude that, despite the profound and traumatic effects of the crisis, the economic and political context for policy response outlined above remains valid. Although the timing and pace of future economic growth is uncertain, the key opportunity remains that of influencing the energy, materials, pollution and waste intensity of new urban–industrial investment. Reductions in intensity will continue to depend on both environmental regulation and increasingly on a performance-based dynamic of continuous improvement within firms. What is perhaps of greatest uncertainty is the strength and balance of different drivers of environmental performance, such as market demand, community pressure and supply-chain management, within East Asia.

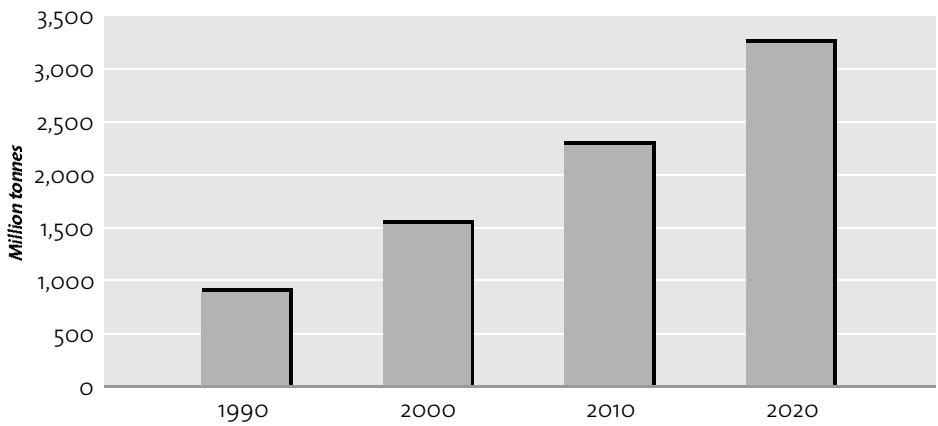
The issue of intensity

Having established the context for policy response, we now examine in more detail the nature of the environmental challenge facing East Asia in coming decades. Environmental problems within the region are in part the result of the sheer pace of growth of the last 25 years of the 20th century, but these problems also reflect an initial emphasis in many Asian economies on pollution-intensive and energy-intensive manufacturing and resource processing industries and the limited attention paid to pollution control and pollution abatement. One consequence of this has been a high energy intensity of GDP. And, although the ratio of commercial energy use to GDP is high relative to OECD standards, commercial energy use per capita is low and expected to rise very rapidly over coming decades. For the four second-tier NICs (Indonesia, Malaysia, the Philippines and Thailand), commercial energy use per capita measured in kilogram oil equivalents was 820 kg in 1996, as compared with 5,123 kg in the higher-income OECD economies (World Bank 1998d). When combined with expected increases in population, the consequence is a very large increase in energy use (see Fig. 1.2) and greenhouse gas emissions (see Fig. 1.3) predicted for developing Asia over the next 20 years.

Reducing pollution from industry and improving local air and water quality have been important environmental regulatory priorities within the region, especially since the early 1990s. There is now a wide variety of efforts under way to strengthen environmental regulatory systems and to promote pollution prevention and clean production (USAEP 1997; World Bank 1999). Given these ongoing activities, two critical questions need to be answered. The first is whether current policy approaches, if widely adopted and enforced, are sufficient to reduce industrial pollution and improve local environmental quality within developing Asia. The second is whether a policy approach focusing on regulation

Figure 1.2 **Energy consumption in emerging Asia**

Source: EIA 1999



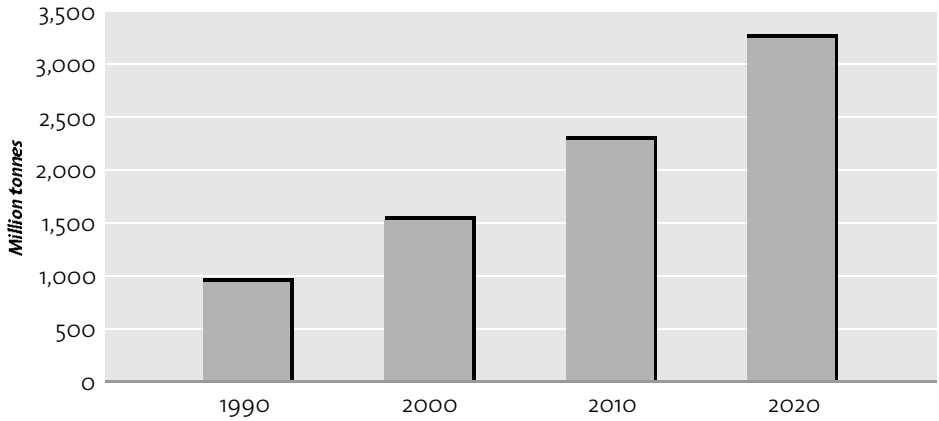


Figure 1.3 **Carbon dioxide emissions in developing Asia**

Source: EIA 1999

of industrial pollution and improving local environmental quality will simultaneously resolve broader environmental concerns, such as resource depletion, escalating fossil-fuel consumption and climate change. Our main conclusion with respect to the first question is that projected outcomes depend critically on the energy, materials, pollution and waste intensity of new investment in East Asia (about which there is a paucity of good data). With regard to the second question, we conclude that current policy approaches—focused as they are on controlling pollution—are insufficient to the challenge, hence our call for a new policy approach to build on and complement existing activity.

Future levels of industrial pollution and environmental quality within east Asian economies are sensitive to two critical modelling assumptions, namely, the rate of growth of industrial output and, most especially, the energy, materials, pollution and waste intensity of industrial activity. Prior to the economic crisis of the late 1990s, most researchers predicted continued rapid growth in industrial output and a reduction in some measures of pollution intensity of industrial activity within the first-tier and second-tier Asian NICs. Actual levels of pollution and environmental quality depend on the relative strength of these two often countervailing trends within individual countries. The analysis is complicated in that growth and pollution intensity are likely to be interdependent variables.

By way of illustration, one influential World Bank (1994a) study of Indonesia projected disastrous increases in pollution in that country by the year 2020, amounting to a tenfold increase in water pollutants, a fifteenfold increase in emissions of suspended particulates into the air, and a nineteenfold increase in emissions of bioaccumulative metals, such as mercury and lead. The pollution intensity of industrial activity with respect to particulates, BOD and toxics (but not bioaccumulative metals) was predicted to decline modestly in Indonesia over this 25-year period as a result of shifts into industrial sectors that were less polluting. But these declines were overridden by a predicted thirteenfold

increase in industrial output by 2020. A second World Bank study predicted a more rapid decline in pollution intensity within industrial sectors, based on the assumption that all new capital investment would have emissions that were 25%–50% lower than existing capital stock (World Bank 1997d). Pollution intensity would fall as new, cleaner technology increased as a share of total capital stock. Under this second scenario urban air quality was still predicted to decline in Jakarta and other South-East Asian cities, but at a less severe rate. It is only under scenarios that assume much more rapid declines in pollution intensity that urban air quality is projected to improve in lower-income East Asian NICs.

What is the basis for possible reductions in the pollution intensity of industrial output? Generally, three broad processes are involved. First, sectoral shifts in the composition of industrial activity away from resource processing into assembly and technology-intensive industries typically reduces the overall pollution intensity of industrial output (though not of toxics and bioaccumulative metals). Second, if new capital investment is cleaner than existing capital stock, then the process of new investment and growth reduces the average pollution intensity of industrial output. Third, strengthened regulatory requirements and enforcement, public pressure, market demand and other drivers of improved environmental performance support more effective pollution control of existing industrial activity (e.g. retrofitting improved end-of-pipe control equipment) and, more importantly, support investment in best available technologies that meet world-class environmental standards, as well as more general pollution-prevention activities, such as encouraging recycling and re-use, and planning decisions that minimise demand for energy and materials.[4]

If the experience of the OECD and first-tier East Asian NICs is a guide, then we should expect that with rising incomes in East Asia all three of these processes will contribute to reducing the pollution intensity of industrial activity, offsetting the effects of increased industrial output. Hettige *et al.* (1997) modelled these effects for water pollution by using data on emissions from a set of developed and newly industrialising countries for the period 1977–89. They found that pollution intensity of industrial activity falls sharply with income up to income levels of US$6,000 per capita and is stable thereafter. These types of finding, along with growing evidence that East Asian NICs are moving to strengthen environmental regulation systems, led some observers to conclude that the region is on the road to reduced industrial pollution and improved environmental quality.

Three points of caution need to be voiced in this regard. First, the anticipated improvement in environmental quality is largely a feature of the first-tier NICs and the medium-income economies of South-East Asia. Thus, even with reductions in pollution intensity of industrial output, air and water quality are expected to continue to decline in lower-income economies, such as Indonesia, as growth in industrial output exceeds the rate of improvement in reduction of pollution intensity. It is important to recall in this regard that all the second-tier NICs had per capita incomes in 1996 of less than

4 Such policies go beyond the firm *per se*, as for example in urban planning activities that minimise transportation flows associated with industry.

US$4,500 and that per capita incomes in China and much of South Asia were less than US$1,000 per capita (see Fig. 1.4). In much of Asia environmental conditions will get worse before they get better (Lohani 1998). Second, as we have seen, the projections by the World Bank and others of lower net industrial pollution in certain East Asian NICs depend critically on assumptions that new capital investment will be 25%–50% cleaner than existing capital stock. In our assessment, this assumption requires careful empirical evaluation (e.g. by documenting the extent to which firms investing in Asia today are choosing, maintaining and extending cleaner technologies).

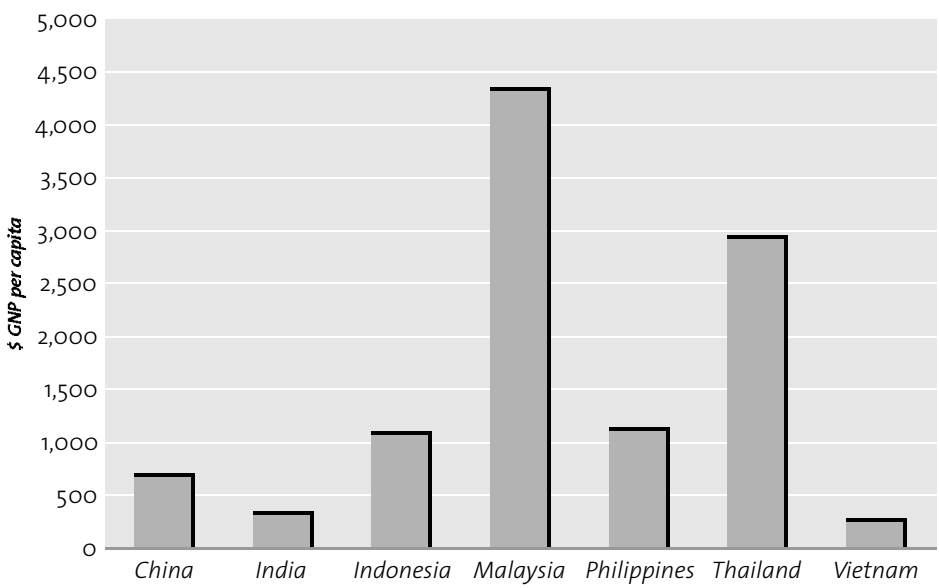
Third, our core concern is with the environmental challenges of rapid urban–industrial growth that are *not* fully addressed through controlling industrial pollution at the plant level. The most visible of such challenges are the ever-expanding use of energy and materials, resource depletion and global climate change. In the area of energy, for example, even with a projected 30% improvement in energy efficiency, energy usage is expected to double by the year 2020. It is on this basis that we propose a policy approach that focuses directly on the energy, materials, pollution and waste intensity of urban–industrial activity, as opposed to addressing these issues indirectly and partially through pollution control.

The drivers of change

The focus on intensity necessarily brings us to the industrial process itself, to shaping the basic processes of investment, technology change and market development within the

Figure 1.4 **GNP per capita (US$),selected Asian countries, 1996**

Source: World Bank 1998d



industrial economy. What determines these investment, technology and market decisions as they relate to environmental performance? The traditional answer to this question is environmental regulatory policy. But environmental regulatory policy is only one means of shaping investment and technology decisions; and it has been most successful in bringing firms and industries into compliance with particular performance standards through end-of-pipe pollution control. Environmental regulatory policy has been less successful in moving firms beyond compliance and engendering a self-sustaining dynamic of continuous improvement. By moving beyond pollution control to the industrial process itself, we are able to call on a range of additional policy drivers, from industrial and urban policy to various forms of private and public governance.

Accordingly, the policy framework we propose supports multiple strategies focusing on a variety of performance drivers. In developing this framework, we recall the elements of the development context laid out earlier in this chapter, including the key challenge of driving down the energy, materials, pollution and waste intensity of future urban–industrial activity. We begin with the role that environmental policy, including environmental regulation, might play in meeting this challenge.

Environmental policy

Our analysis suggests that environmental regulatory systems in Asia will be called on to support three types of goal. First, regulatory systems have a responsibility to protect public health. Most likely this will be achieved through the establishment of clear and consistent ambient environmental standards that are in turn linked to discharge limits for individual facilities. Once ambient and discharge standards are set, regulators must ensure compliance. Some countries, particularly in the first-tier NICs, have gone a long way towards doing just this. In others there remains a need to strengthen the legal authority and the institutional and technical capability of regulatory agencies. It is unlikely to be the case that Asian economies will adopt fully the kinds of traditional command-and-control regulatory approaches put in place in many OECD economies during the 1970s and 1980s. These approaches are now widely seen as being too costly and too difficult to implement (Russell 1990). At the same time, the opportunity exists to learn from the experiences within the OECD and take advantage of many emerging regulatory opportunities, including: (1) a multimedia approach to environmental management and control; (2) greater public disclosure of environmental performance; (3) firm- and plant-level flexibility in how performance goals are met; (4) increased use of market-based instruments, such as pollution taxes and tradable permits.

Second, environmental regulatory agencies will be asked to reduce industrial pollution through pollution prevention and clean production (as opposed to pollution control). Crucially this involves correcting market, policy and co-ordination failures that discourage firms from searching for and adopting production practices that lower energy, materials, pollution and waste intensity. Partly this involves correcting the bias of much regulatory policy to pollution-control solutions, but it also involves harnessing market processes to the goal of clean production. Unlike pollution control, which is almost always derivative of regulatory policy, pollution prevention and clean production are responsive both to regulatory policy and other competitive pressures in the marketplace,

such as materials costs and opportunities for win–win economic savings. Here the key advance will be in reducing the often high transactions costs and learning costs associated with clean production alternatives.

Clearly, initiatives pursued under the first two goals described above (protecting public health and supporting clean production) will contribute towards the goal of clean shared growth. However, resultant improvements in energy and materials efficiency, in particular, are unlikely to be sufficient to the scale of improvement that is required to offset continued urban–industrial growth. Accordingly, we anticipate that the challenge of clean shared growth will place new demands on environmental regulatory systems. It is to this third set of expectations, linked to substantial improvements in energy, materials, pollution and waste intensity, that we now turn.

Extending environmental policy

In the context of clean shared growth in developing Asia, environmental policy must make three critical contributions. First, it must articulate clear environmental and developmental goals. One result of the regulatory re-invention process within OECD economies has been recognition of the importance of clear and consistent goals that communicate priorities and directions to all segments of society, and set benchmarks for measuring progress (NAPA 1995; Steinzor 1998). Such a goal-driven and outcome-driven policy framework fits well with approaches taken to past development successes—in agriculture, primary education, export-led industrialisation and others—by East Asian NICs. But it must also reflect emerging claims for greater public participation and transparency in the policy-making process.

Second, environmental regulation—and regulators—must support the integration of policy-making and policy implementation across multiple organisational domains, from industry to trade and technology, from public policy to corporate management, from local environmental quality to global and regional environmental concerns and from national policy to regional and international regulation. Traditional environmental policy has been pursued largely as an issue of environmental regulation and largely within environmental ministries or departments. The need now is to introduce environmental goals into line ministries and then to integrate environmental regulatory policy with industry, trade and technology policy. Such integration must also co-ordinate policy-making at multiple geographical scales, from the local to the national, regional (e.g. ASEAN) and international (e.g. WTO).

Third, environmental policy must support a performance orientation on the part of firms and industries. Crucial to this will be improvements in the quality and quantity of information available on the environmental performance of firms. It should by now be clear that information is a powerful policy tool. Information will increasingly become a driver of change both for firms, for whom it is the foundation of performance-based management, and for government and society at large. Fortunately, there is substantial evidence that information development and disclosure are promoting improved environmental performance of industrial firms in East Asia. Indonesia has a colour-coded environmental rating and disclosure programme for major water polluters that has improved environmental performance (see Chapter 7). China's sustainable cities index

programme, which annually rates, ranks and publicly reports on the environmental performance of its major cities, appears to be influencing the location of industrial activity, the rate of growth of urban infrastructure and plant-level investments in pollution control.

To date, information on environmental performance has largely been used as a tool of environmental regulation, that is, to assess whether firms are meeting externally imposed regulatory standards. Increasingly, this information will be used in at least four other ways:

1. As a tool of strategic management by firms that are seeking to optimise their own environmental performance, whether it be with respect to energy efficiency or life-cycle impacts of products
2. As an element of financial and risk management by banks, investors, insurance companies and the financial community at large, in the same way that standardised accounting information is currently used
3. As part of a marketing and corporate management strategy—increasingly, purchasing decisions inside and outside of the firm will be linked to information on environmental performance, whether this be through market regulations, the ISO 14000 series, green labelling or supply-chain management
4. As a tool by which communities, citizens and organised groups in civil society hold governments (their own as well as others), as well as the private sector, accountable for performance

Public policy must foster and harness these trends toward performance-based management in the public and private sectors.

Industrial and technology policy

One of the conclusions of our analysis is that meeting the challenge of clean shared growth is as much an issue of industrial and technology policy as it is of environmental policy *per se*. This is because successful efforts to reduce the energy, materials and pollution intensities of industrial production will depend critically on the development and deployment of new technologies and on the capability of firms to use existing plant and equipment efficiently, to know how to improve on it and innovate with it and how to manage efficiently the process of technical change and technology acquisition. Unless firms can do these things and do them well, there may be significant limits to their ability to ratchet up into skills-intensive industrial growth (as Korea and Taiwan have done in different ways [Kim 1997; Wade 1990]) and to respond to pressures from regulatory agencies, communities and markets that would push them in a direction that lowers energy, material, pollution and waste intensities.

If we are right, three important implications follow. First, policies that promote firm-level technical learning and capabilities acquisition that are necessary for the second-tier NICs to recover from the current economic crisis and gain competitiveness in skills-intensive manufactures are likely to be equally good for the reduction of energy, material,

pollution and waste intensity. They should make it easier for firms to engage in better housekeeping practices and minor process innovations that prevent pollution. They should make it possible for firms to 'stretch' existing plant and equipment by substantially modifying it to reduce energy and materials use. They should also make it easier for firms to evaluate imported plant, equipment and technology. Second, because intensity reduction is or will be a relatively new activity for industrial firms in the NICs and Asia more generally, industrial firms in the NICs and in Asia are likely to need industry-specific and technology-specific information (and specialised technical training) on how to do this. This is the just the kind of information and specialised training that institutions that are part of the national technology infrastructure (such as industrial technology institutes or standards agencies) are good at providing. They should be encouraged to provide such information and training to overcome information failures and the high transactions costs associated with reducing energy, materials, pollution and waste intensities. This is most likely to be true for small and medium-sized enterprises (SMEs), and governments in the NICs would be advised to consider expanding existing multinational corporation (MNC) and SME linkage programmes designed to do this to include environmental considerations (Battat *et al.* 1996). It may also make sense to consider developing such programmes for large domestic firms and their suppliers.

Not surprisingly, doing all of this and doing it well also requires governments to invest in national technical capability-building by supporting education, particularly in engineering (and environmental engineering) and by investing in institutions that test materials, inspect and certify quality standards (including environmental quality standards such as the ISO 14000 series), calibrate measuring instruments and provide difficult-to-obtain information (including in the area of clean technologies). As the experiences of Korea and Taiwan demonstrate, large investments in literacy, in education and in engineering training make it easier for firms to acquire technical capabilities (Tan and Batra 1995).

For the short and medium term, most technology and capital equipment will continue to be sourced from OECD economies. Accordingly, the kinds of investment and technology transfer, adoption and use policies described here have to extend across international boundaries and from OECD economies to developing Asia. Within this international domain, trade and investment policy emerges as an additional crucial policy lever for shaping technology choices and more generally shaping the environmental policy of industry.

Trade and investment policy

As discussed earlier in this chapter, one of the defining contexts for clean shared growth in Asia is the degree to which development has occurred in parallel with increasing economic integration on a global scale, and especially in terms of levels of international trade and investment, as well as the prominent role of MNCs in the development process. This suggests that international multilateral regulation of investments and market processes, as well as private-law models of international business regulation (such as the ISO 14000 series) can be used as policy tools to promote reductions in energy, materials, pollution and waste intensity of new industrial investment in developing Asia.

To date, there has been only mixed success in building in environmental concerns into multilateral agreements. Policy initiatives toward harmonisation of environmental standards within multilateral trade agreements and introduction of environment riders within the multilateral agreement on investment have achieved only modest gains, partly because of concerns on the part of developing countries that environmental standards will be a form of indirect protectionism (e.g. see Esty and Gentry 1997). More progress has been made with explicit international environmental agreements, such as the Montreal Protocol and the Framework Convention on Climate Change. Despite the limited achievements to date, multilateral agreements remain an important domain for policy intervention.

The recent explosion in private capital flows—both direct foreign investment by multinational corporations and of portfolio flows—means that states can no longer flout what Matthews (1997: 57) calls the *de facto* rules being set by markets. This can be seen most clearly in Asia's current financial crisis. With respect to the environment, we are witnessing the rapid emergence of what Roht-Arriaza (1995: 486-99) refers to as a global private-law model of environmental regulation. This private-law model relies, at least in part, on private, producer-based systems of international environmental standards. Sometimes this takes the form of MNCs imposing their home-country practices on their subsidiaries located elsewhere (Brown *et al.* 1993) or on their suppliers. Sometimes this takes the form of private business organisations, such as the World Business Council for Sustainable Development (WBCSD), the Coalition for Environmentally Responsible Economies (CERES), the Global Environmental Management Initiative (GEMI), the International Chamber of Commerce (ICC)[5] or the Chemical Manufacturers' Association (CMA),[6] creating their own standards for measuring and comparing the environmental impacts of their activities (Roht-Arriaza 1995: 497-99). Sometimes, as with the ISO 14000 series, it takes the form of development of a wide-ranging set of private-law international environmental standards governing everything from the development of acceptable private-sector environmental management systems to environmental auditing, product life-cycle analysis and environmental labelling (Roht-Arriaza 1995).

These global links are of especial importance to the externally oriented export economies of East Asia. To date, most attention has focused on developing a regulatory structure to match the global economy, whether through WTO, the General Agreement on Tariffs and Trade (GATT), APEC or other international and regional organisations. It is possible that these emerging international regulatory bodies will be important drivers of improved environmental performance, but it is *more* likely that the market processes of globalisation described above will be of importance. Having said that, it is far from clear that private-law regulation will develop as a powerful driver of superior environmental

5 In 1991 the ICC created the *Business Charter for Sustainable Development* in response to recommendations in the 1987 Brundtland Commission report on the environment (Roht-Arriaza 1995: 498).

6 In North America, the Chemical Manufacturers' Association (CMA) developed its own 'Responsible Care' programme in 1991. The programme binds CMA members to a set of principles regarding safe chemical development, use and transfer as well as to a code of management practices (Roht-Arriaza 1995: 498).

performance in Asia. Our recommendation in this regard is for the urgent development of effective systems of performance measurement. A good place to begin is with the development of a standardised, low-cost, scaleable approach to measuring the energy, materials, pollution and waste intensity of production and of technology choices. The measurement systems should include information on greenhouse gas emissions. We must then investigate how such information can be used most effectively by firms, consumers, suppliers, municipalities and the like. As with price and quality, the ability to measure environmental performance is crucial to harnessing market processes and private management systems to the goal of clean shared growth.

Urban policy

Currently, in developing Asia rapid industrialisation and rapid urbanisation are tightly intertwined. The majority of industrial activity occurs within urban areas, and the environmental impacts of industrial activity are amplified by concentrated urban form. Precisely because cities are the locus for so much of the industrial transformation under way in developing Asia today, they are also the focal point for civic engagement with the development process. Such civic engagement at the urban scale will probably be critical to achieving clean shared growth, and urban policy can make an important contribution by enhancing governance capabilities within cities, by promoting effective models of public–private partnership and by enhancing the quality and quantity of information available on the environmental performance of industry within cities.

Why is enhanced urban governance and civic engagement likely to be of importance to clean shared growth? First, there is some evidence to suggest that successful policy development and implementation benefits from the opportunity to take account of place-specific conditions accorded by devolution of decision-making to the local level. This is especially the case where policy decisions require difficult trade-offs among multiple potentially competing priorities, such as improving environmental conditions, reducing unemployment and improving economic welfare. Second, collaborative governance and civic engagement promote broad 'ownership' of the regulatory and policy initiative. Such broad ownership occurs when all participants (community groups, business, government, unions and others) have a stake in the success of a policy approach and recognise that systemic failure is a worse option than seeking compromise and common ground. Such ownership is likely to be of particular importance as developing Asia continues to undergo wrenching changes not just in economic structure but also in social and political organisation.

Beyond this critical issue of promoting enhanced governance capability at the urban scale, urban policy can support clean shared growth by enhancing urban management, most especially in the areas of location and land-use planning and in the provision of urban infrastructure. In much of developing Asia, urbanisation is taking the form of massive 'mega' cities with population concentrations of upward of ten million people. Such urban concentration increases the stress on dissipative systems within the natural environment and creates extreme localised environmental problems (e.g. with water supply and waste disposal). Location and land-use policy has a major role to play by structuring where industries locate and how people move from home to work.

Cities also have to do a better job at managing urban infrastructure. Available evidence suggests that infrastructure expansion is not keeping up with rapid population and economic growth. This is partly because of the fact that city governments often lack the capacity to tax the new income created within cities as a means of financing infrastructure investments. But in some countries it is also a result of the lack of competition among public service providers, lack of managerial autonomy and outcome accountability and poor relations between service providers and end-users (World Bank 1994b).

Governance and civil society

Although cities will be the locus for civic engagement and greater public pressure on governments and the policy process, this urban-scale activity will be but one part of the continuing development of civil society in Asia in coming decades. Indeed, one of the great unknowns of the development transformation that will unfold in Asia over the next 30 years is the way in which civil society will develop and the attendant forms of governance that will emerge. This dimension of the development context also will likely show a high degree of variation among Asian societies.

Most analyses of civil society focus on the growth of NGOs and the role that information access now plays in supporting increasingly powerful international networks of NGOs. Rapid reductions in the costs of communicating information, over fax machines, telephones and the Internet, now mean that NGOs in one country can and are easily reached by NGOs in any other country. The impact of this on private and public policy-making within and between countries has been amply demonstrated by Matthews (1997). As she sees it, NGOs now deliver more development assistance than the entire United Nations system (excluding the World Bank and the IMF), and they are increasingly successful in pushing even the largest and strongest governments around. Thus when the United States and Mexico attempted to hammer out a trade agreement behind closed doors, NGOs in both countries forced both governments to negotiate more openly and to pay greater heed to health and safety, pollution, consumer protection and labour practices than either had intended (Matthews 1997: 54).

What the future holds in this regard is far from clear. Under these conditions of uncertainty, our recommendation is for a proactive process of participatory engagement with community groups, NGOs and others. In short, engagement carries a higher probability of benefit, and lower risk, than exclusion. Although we cannot as yet systematically demonstrate that civic engagement will succeed as a driver of clean shared growth, we do know that exclusion from the policy process undermines effectiveness and legitimacy of outcome. As with the case of private business, the bedrock of such civic engagement is information. Here we cite the success of the PROPER environmental rating and disclosure programme in Indonesia to secure improvements in environmental performance (see Chapter 7).

Summary and conclusions

There is no road map to cleaner shared growth in developing Asia, but we can already recognise (1) the scale of the challenge, (2) the important points of strategic entry and (3) the likely driving forces of change. *We submit that the critical opportunity lies in reducing the energy, materials, pollution and waste intensity of new urban and industrial investment.* Success in this endeavour requires harnessing 'new' drivers of environmental performance, namely information, globalisation and technology. This would entail acceptance of clean shared growth as a strategic goal, focusing on the development of clean technologies, industries and urban infrastructure as sources of economic advantage and environmental improvement. This commitment must be communicated as a clear 'market signal' through which to influence the future technology and investment decisions of private firms, capital markets, urban municipalities and consumers.

Leveraging of private industry and capital as the principal agents for developing clean products and production processes would also be required. This can only be achieved by strengthening the internal and external drivers of the technology and investment decision. Partly this will involve the establishment and enforcement of environmental standards. The new policy opportunity, however, involves promoting the use of information, performance measurement, market pressure and supplier linkages as a driver of superior performance. Globalisation has substantially enhanced the likely effects of such public and market drivers

Public policy has three roles: that of (1) environmental regulation, (2) of fostering information and market pressures and (3) the use of economic and technology policy, land-use control, licensing and other instruments to promote clean investment and technology decisions directly.

What would a policy agenda look like that supports these goals? The policy matrix would begin with a portfolio of environmental regulatory institutions, policy instruments and capacities for implementation and enforcement. Effective environmental regulatory systems are the bedrock of clean shared growth. Such regulatory systems begin with clear performance expectations for firms and industries; these performance expectations must be consistently enforced and backed by appropriate responses to non-compliance, ranging from penalties to technical assistance. The regulatory expectations must in turn be supported by effective policy instruments, and here healthy debate continues around the appropriate mix of command-and-control, market-based instruments and information-based policies, such as performance disclosure. These policy instruments must be tailored to the range of firms and industries present within an economy, including SMEs, and foster innovation in new policy approaches, such as sector-based and place-based environmental management. The environmental regulatory system must progressively be built around concepts of pollution prevention and clean production, going beyond end-of-pipe pollution control. It must also address issues of resource pricing and infrastructure financing and development. Also, the environmental regulatory system must encourage a wide portfolio of private initiatives, ranging from the ISO 14000 series and supply-chain management to environmental due diligence in investment.

To varying degrees, the developing economies of South-East Asia have begun to put in place the elements of such an environmental regulatory system. The first-tier NICs (Hong Kong, Singapore, South Korea and Taiwan) have the core elements of a command-and-control environmental regulatory system in place. Here the important priority is to move beyond end-of-pipe pollution control toward the use of market-based instruments, pollution prevention and clean production and to strengthen non-regulatory drivers that support the achievement by firms of superior performance that goes beyond compliance with baseline environmental standards. These developing regulatory systems must increasingly search for more efficient ways to yield continuous improvement in environmental performance, especially among SMEs. Among the second-tier NICs (Indonesia, Malaysia, the Philippines and Thailand) and China there is an urgent need as a next step to strengthen the basic institutions of environmental regulation and to ensure the development of effective capacities for implementation and enforcement.

In some economies (Thailand and the Philippines), environmental agencies operate without landmark environmental legislation that empowers them to set ambient and emissions standards, monitor performance and enforce compliance (see Rock *et al.* 1999b). In others (Indonesia and Thailand), regulatory agencies have no authority to monitor, inspect or enforce facility-specific emissions standards. In virtually all of these economies, regulatory agencies lack both sufficient technical capacity and sufficient resources to manage national environmental protection programmes effectively. Even as these basic capacities of environmental regulation are being strengthened, the second-tier Asian NICs must draw on the experience of industrial economies around the world and move aggressively toward the adoption of market-based instruments, pollution prevention, clean production and superior environmental performance.

If environmental regulation is the bedrock of clean shared growth, much of the new policy opportunity—and the urgent policy imperative—involves going beyond compliance in a dynamic of continuous improvement leading to superior environmental performance. It is only with such superior performance that the scale effects of rapid urban–industrial growth will be offset by parallel reductions in the energy, materials, pollution and waste intensity of economic activity. Here, as a first step towards such a transformative development dynamic, we highlight four broad policy initiatives. In various forms, these initiatives are appropriate to all of the Asian NICs and are supplemental to environmental regulatory policy *per se*.

The first initiative involves strengthening non-regulatory drivers of environmental performance. The range of *potential* non-regulatory drivers is broad, including market demand, community pressure, cost reduction, market development and others. The key to harnessing these drivers, we argue, is the development and disclosure of transparent, low-cost, scaleable and standardised information on the environmental performance of production lines, enterprises, firms, industrial sectors, urban areas and national economies. Various experiments with such performance metrics are under way in Asia, such as the PROPER programme in Indonesia (see Chapter 7) and China's urban environmental indicators programme (Rock *et al.* 1999b). An important policy priority is the development and widespread adoption of effective systems of environmental performance measurement and disclosure.

The second initiative involves the identification and implementation of development goals for clean shared growth. Here we would highlight four dimensions of the goal-setting process: it must be directed to the next 20 years of development transformation in the region (2020); it must be framed in terms of energy, materials, pollution and waste intensity of urban–economic activity and in terms of basic economic processes of investment and technology change; it must be forged in partnership with business and other constituencies; and it must facilitate the identification and co-ordination of environmental performance goals across a range of relevant policy domains, from industry to technology and trade.

The third initiative focuses specifically on enhancing the capability of firms and industries in Asia to develop, use, adapt, adopt and improve on product and process technologies and associated manufacturing practices in a dynamic of continuous improvement. In the absence of such *in situ* industrial and technological capabilities, it will be extremely difficult for Asian economies to achieve the kind of economic transformation needed to improve substantially both environmental performance andsocio-economic welfare. There is no one model for how such technological and managerial capacity-building might be achieved. Success in South Korea was heavily dependent on large firms (Kim 1997); in Taiwan it involved close collaboration between industry and government-sponsored R&D centres (Rock 1996b).

The fourth priority initiative is that of enhancing institutional capabilities for clean shared growth at both the local and the national scale and in terms of Asia's participation in regional and international environmental agreements. Increasingly, many policy decisions about clean shared growth are being devolved down to local communities and urban areas; it is important that the devolution of responsibility also be accompanied by the development of institutional capability and resources for policy implementation. At the same time, considerable attention needs to be given to the interplay among different levels of governance, from the local to the national to the international, and to the horizontal interplay among different policy domains.

We conclude with one final comment. It is important to recognise how little we know about many specific aspects of clean shared growth. For example, we lack systematic data on the characteristics of current industrial investment and technology flows in Asia. How clean, or dirty, is current investment? How effective are current policy initiatives, such as information clearinghouses and clean production round tables? To what extent do current production technologies present win–win opportunities in Asia, yielding economic and environmental benefits? There is an urgent need for systematic research and evaluation to parallel the kinds of policy innovation outlined in this book.

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