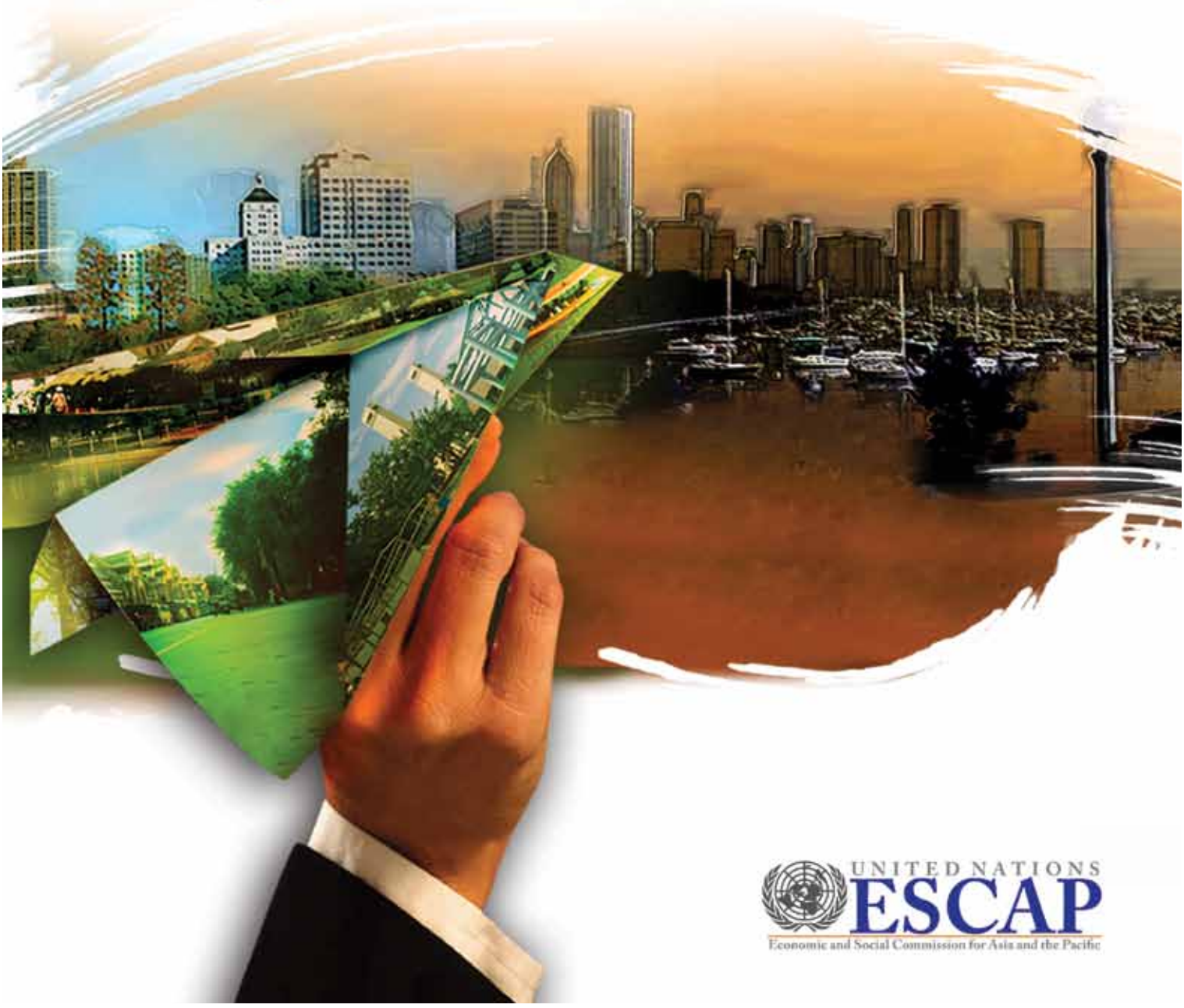
Greening Growth

in Asia and the Pacific

Follow-up to the World Summit on Sustainable Development: Taking action on the Regional Implementation Plan for Sustainable Development in Asia and the Pacific, 2006–2010



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Economic and Social Commission for Asia and the Pacific

ESCAP is the regional development arm of the United Nations and serves as the main economic and social development centre for the United Nations in Asia and the Pacific. Its mandate is to foster cooperation between its 53 members and 9 associate members. ESCAP provides the strategic link between global and country-level programmes and issues. It supports Governments of the region in consolidating regional positions and advocates regional approaches to meeting the region's unique socio-economic challenges in a globalizing world. The ESCAP office is located in Bangkok, Thailand. Please visit our website at <www.unescap.org> for further information.

The green areas of the map represent the members and associate members of ESCAP

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Foreword

Only six years ago, in 2002, at the World Summit on Sustainable Development, the world's Governments reaffirmed their commitment to safeguarding the environment for future generations. They did not anticipate just how soon the situation would deteriorate. We face a daily barrage of bad news: accelerated climate change, natural disasters, food shortages. In 2008, it is clear that our stewardship of the Earth is not just a responsibility for the future: we have to act immediately to protect our own generation.

No country is immune. All are being forced to reassess their food, water and energy security, and to take steps to mitigate and adapt to climate change. The countries of Asia and the Pacific are in the front line. This is the world's most populous and fastest growing region, with corresponding potential for determining the future of global populations. It also has the majority of the world's poorest people who depend directly on environmental resources for their very survival.

As a result, ESCAP member States, from the least to the most developed, are engaging in serious introspection, assessing the implications for human well-being of their current paths of economic growth and considering how they should respond. The financial crises of 2008 and the begining of what may be a global recession have been cited as an opportunity to rethink the way that Governments approach economic growth and development.

In March 2005, 52 Governments and other stakeholders from Asia and the Pacific convened in Seoul at the Fifth Ministerial Conference on Environment and Development (MCED). They agreed to move beyond the sustainable development rhetoric and pursue a path of "green growth." For they adopted a ministerial declaration, the Seoul Initiative, and the Regional Implementation Plan for Sustainable Development in Asia and the Pacific, 2006-2010.

Complementing the work of sister United Nations agencies, the role of ESCAP is to help Governments fulfil these commitments. To do this, Governments must make difficult policy choices; millions of people across the region still lack even the basic minimum for a decent quality of life, and can expect to escape poverty only if they share in continued economic growth. Zero growth is thus not an option, but it has to be the right kind of growth.

Since the 2005 MCED, ESCAP has engaged regional Governments in discussing policy options and approaches for promoting green growth at various policy forums. The rich discussions and the perspectives of regional Governments and experts are reflected in this publication.

Policy options and approaches that can expand economies while simultaneously improving welfare, reducing poverty and protecting natural capital are brought into focus. The publication explores the potential, for example, for eco-tax reform, developing sustainable infrastructure, encouraging sustainable consumption and greening business activity. Just as important, it illustrates these options with examples from across the region. We hope this publication provides fresh but practical perspectives, and look forward to seeing it used by decision makers across the region.

Noeleen Heyzer
Under-Secretary-General of the United Nations
Executive Secretary of ESCAP

Abbreviations and Acronyms

AFD	Agence Française de Développement
CO_2	carbon dioxide
ERP	electronic road pricing
ESCAP	Economic and Social Commission for Asia and the Pacific
ETR	eco-tax reform
GDP	gross domestic product
GHG	greenhouse gas
ISO	International Organization for Standardization
NGO	Non-governmental organization
NGV	natural gas vehicle
PV	photovoltaic
SO_2	sulphur dioxide
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund

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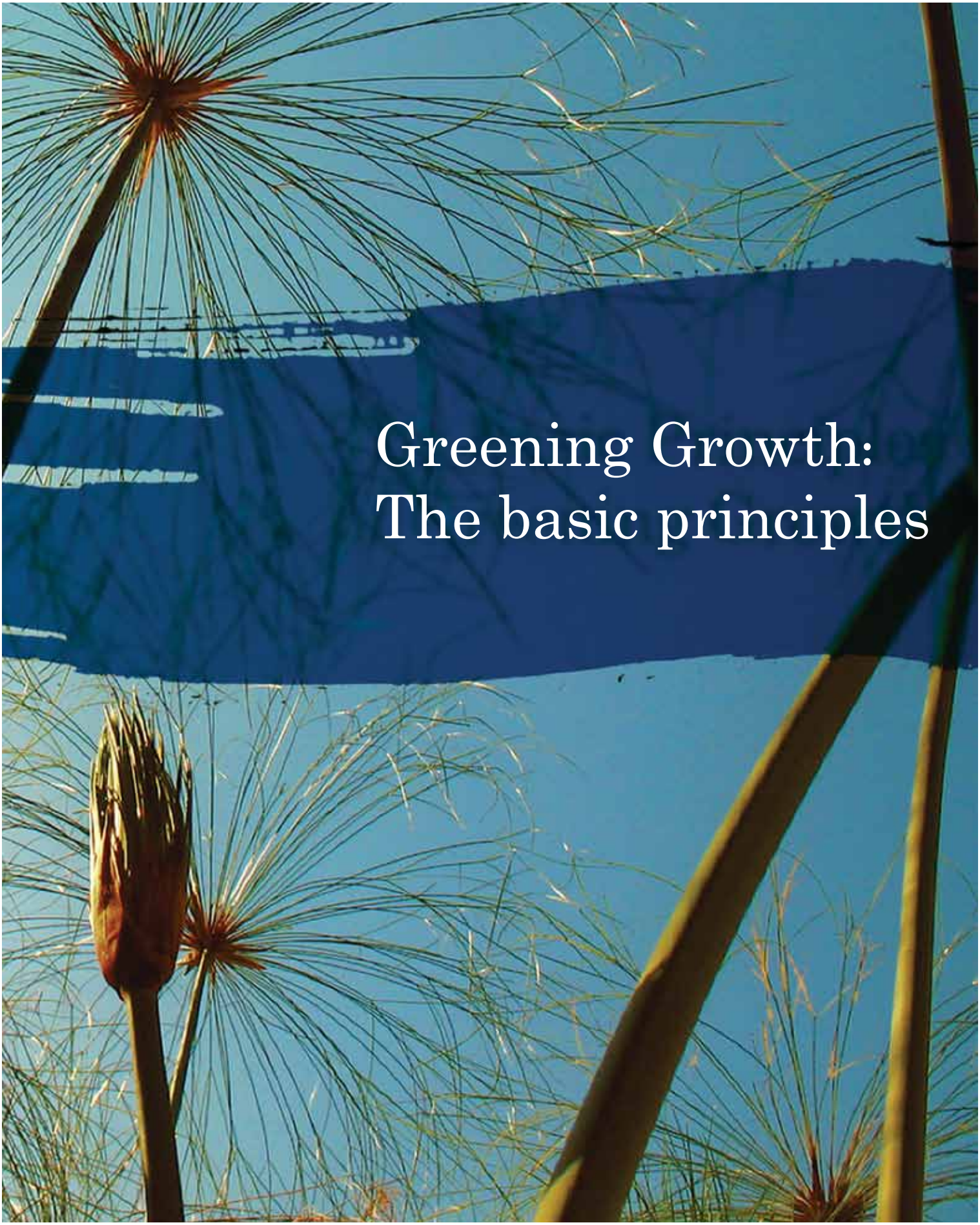


Greening Growth: The basic principles

··· greening growth: the basic principles

- Quality of economic growth
- Eco-efficiency of economic growth
- Environmental sustainability vis-à-vis environmental performance

Through its focus on the greening of economic growth, the work of ESCAP recognizes that different patterns of economic growth lead to different outcomes for ecological integrity and therefore also for human well-being. The idea that the "quality" of economic growth differs depending on policy choices, and that all countries - including developing countries - can choose their development path, is a basic principle underlying the work ESCAP does in greening economic growth.

Quality of economic growth, in the context of sustainable development, may mean different things in various countries and regions. In Asia and the Pacific, overall, there has been a coincidence of rapidly expanding economies, poverty and substantial future consumption pressures, as well as a natural resource base that is more limited than any other in per capita terms. Thus, a focus on meeting human needs and improving well-being with the lowest possible ecological cost is more relevant in Asia and the Pacific than in any other global region. Developing policies to promote and measure the eco-efficiency of economic growth is therefore a key way to meet the most important challenge to sustainable development in this region reducing the pressure on the natural resource base while continuing to meet human needs.

And how is eco-efficiency achieved in practice? In the ESCAP report entitled "State of the Environment in Asia and the Pacific 2005: Economic Growth and Sustainability"[1] , as well as in Ministerial Conference on Environment and Development outcomes, there has been an emphasis on the difference between policies and institutions that work to improve environmental performance, and those that contribute in a meaningful way to improving environmental sustainability. A focus only on improving environmental performance (that is, the end result, and mainly pollution control) results in end-of-pipe solutions. At the same time, there is a need to take action to address the environmental sustainability of the economy where the biggest eco-efficiency gains can be achieved. The green growth approach provides the tools for this.

Quality of economic growth

"We have unquestioningly accepted the notion that GDP provides the truth about how well a country and its people are doing. But how much more happiness has wealth brought, even to the richest among us?"

Prime Minister of Bhutan, Mr. Jigmi Y. Thinley
International Conference on Happiness and Public Policy
July 2007, Bangkok.

Across Asia and the Pacific, Governments are beginning to engage in serious thought about the quality of their economic growth. They are asking: Is our economic growth pattern leading to increased well-being, human security and happiness in the long run? Bhutan, Cambodia, China, Kazakhstan, Thailand and Viet Nam are among the front-line Asian and Pacific countries that are intensifying their scrutiny of how economic policies influence quality of growth and, consequently, outcomes for human well-being.

If happiness is not directly correlated to income, then what other factors influence happiness beyond economic growth? This question was explored at the international conference on Happiness and Public Policy held in Bangkok on 18 and 19 July 2007 and organized by the Public Policy Development Office of Thailand, ESCAP and other organizations. Participants reviewed national initiatives to measure societal progress from a more holistic perspective. The National Economic and Social Development Board of Thailand is piloting the Green and Happiness Index; the Gross National Happiness index introduced in Bhutan is one of the first initiatives of its kind. These, and other methodologies for assessing happiness, include a component that recognizes environmental quality.[2]

Reviews of progress on achieving the Millennium Development Goals justify a growing uneasiness with prevailing economic growth patterns, evidenced in the media and by some research. Only a few countries have managed to increase incomes at all levels of society. In most countries, the gap between rich and poor is growing. However, income inequality is only part of the picture. Gender-based inequalities in access to health care and rural-urban inequalities in relation to access to water and sanitation are also highlighted by these reviews. Despite the picture of spectacular economic growth and poverty-reduction that the region presents, over half a billion people in the region are undernourished and one in three children under 5 years of age are underweight.

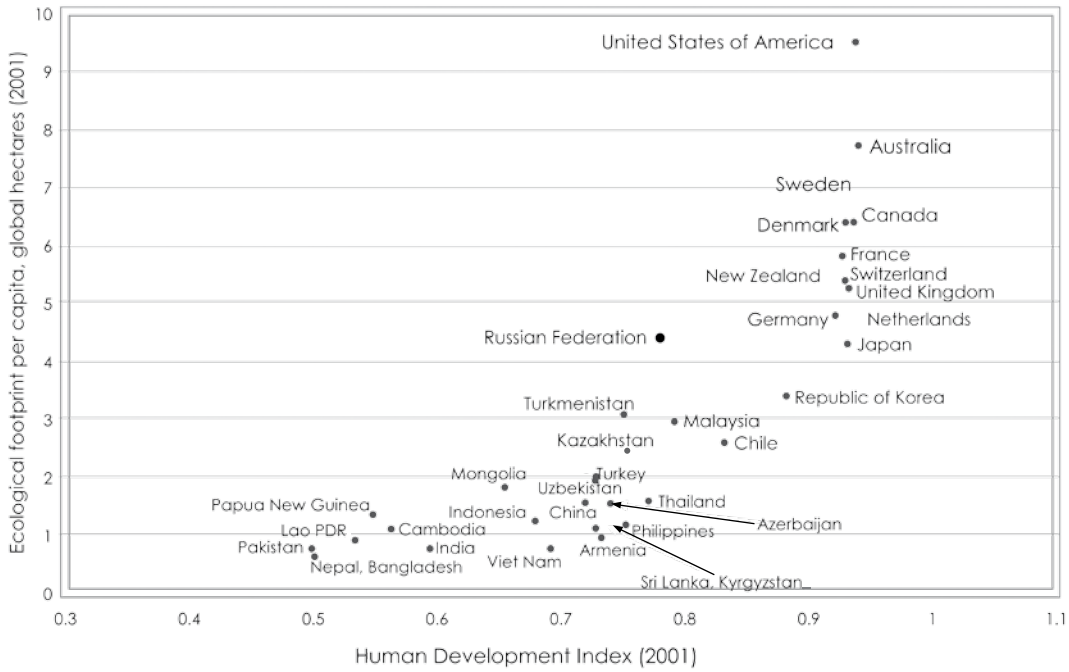
The degradation of the natural resource base exacerbates the situation and makes it more difficult to advance towards achieving Goal 1 (eradicate extreme poverty and hunger) in a way that benefits all persons in society. There is continuing evidence of reduced natural capital in the form of declining air quality in many cities across the region, land degradation and desertification, shrinking natural forest cover and increasing water stress. The limitations of and continuing threat to natural capital compromise the ability of Governments to meet the still substantial needs for economic growth.

Most importantly, current and projected patterns of consumption and production point to mounting future environmental pressures, pressures that not even the improvements in pollution control that sometimes accompany economic growth will be able to relieve. "Grow now, clean up later", is no longer an option. Improving the ecological quality of economic growth requires greater focus.

Ecological footprinting has been developed as an indicator of environmental pressures. This measure can help show that different countries have different ecological patterns of economic growth. High levels of socio-economic development do not always imply correspondingly high levels of environmental pressures, as shown in figure 1.

The evidence that different patterns of economic growth have different outcomes in terms of human well-being highlights that even developing countries have choices.

Figure 1 : Environmental pressure and human development



Source: Ecological footprint per capita: data provided by the Global Footprint Network, July 2005; Human Development Index: United Nations Development Programme, Human Development Report website, accessed from <http://hdr.undp.org/statistics/>on 2 February 2006.

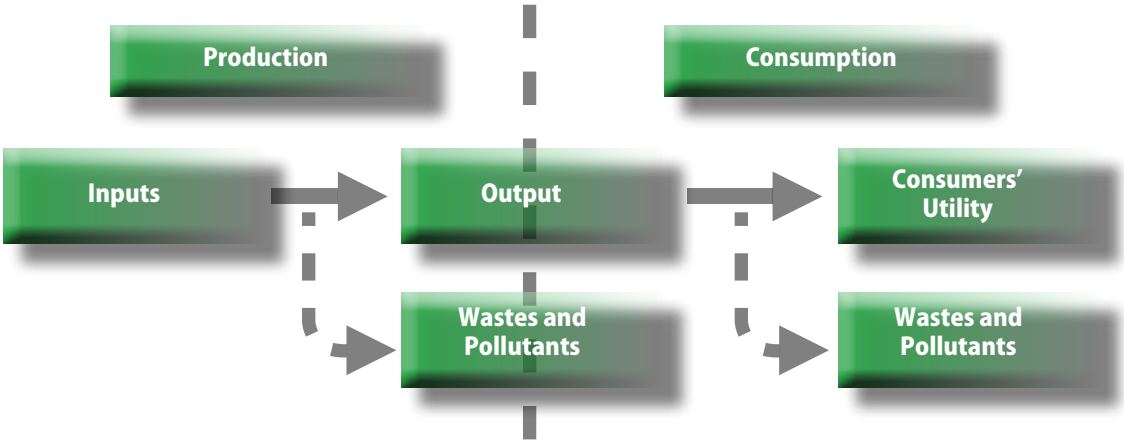
Through its work on the "ecological quality" of economic growth, ESCAP has been addressing a number of key questions, including the following:

- Fiscal policy and pricing is the "software" of our economies and societies. Are fiscal policy and pricing programmed" for the kind of economic growth that maximizes human well-being and minimizes environmental impact, or do they promote economic growth at all costs? Do fiscal policy and pricing reward and facilitate investments made in natural capital commensurate with the ecosystem goods and services that this natural capital is expected to provide?
- Are current patterns of infrastructure development locking countries into resource-intensive, socially excluding lifestyles for decades into the future, or is there sufficient effort to develop infrastructure in a way that maximizes service delivery and reduces environmental impact?
- Is consumption being promoted as a means to improve human well-being, or as an end in itself? How can sustainable consumption choices be created to meet the demand of the growing numbers of conscientious consumers?
- Are businesses able to transform their practices quickly enough to restore, rather than destroy, natural capital? How can barriers be removed to allow business to achieve this?

Eco-efficiency of economic growth

Eco-efficiency, or minimizing environmental pressure while maximizing economic benefit, is a key sustainability principle. A country's economy can be thought of as a huge resource-processing plant. Raw materials, including energy and water, go into the economy as inputs to various production or consumption processes. At the other end, the result is goods, services and waste. The transformation process is intended to result in some human benefit. Maximizing the efficiency of resource use and minimizing pollution during the entire transformation process across economic sectors is critical to achieving sustainable development or economic benefit (see figure 2).

Figure 2 : Production and consumption inputs and outputs



In 2000, the World Resources Institute undertook a study of material flows across five economies, tracing the inputs of raw materials (minerals, other raw materials and energy) to determine the amounts that were used to create durable material wealth (material in manufactured goods and infrastructure that would exist for more than a few years) and the amounts that ended up as waste. It was found that certain economies seemed more predisposed than others to create higher proportions of waste. In one case, for every unit of material wealth created, three times the amount of waste was created. In others, the ratio was closer to 1 to 1.2.[3]

Patterns of resource use and waste production vary from country to country, depending on the kind of growth patterns (a function of public policy) or the predominant lifestyles that have been chosen. As the prices of raw materials, food and energy rise, decision makers bear an even greater responsibility to determine whether a country's scarce financial resources ultimately end up in the production of waste (in all forms) or in the production of durable wealth, human capital and social capital which are the building blocks for building blocks for resilient societies.

In the context of rising prices of raw materials, production activity, pressured by the need for greater profit, increases resource use efficiency. However, in the case of consumption, resource efficiency is simply left to individual consumers. The resource efficiency of consumption deteriorates as economies grow: cars and houses get bigger as incomes rise. Consumption efficiency can be expected to improve only through consistent public policy interventions such as incentives for car pooling or increased access to public transport.

But how can eco-efficiency be measured across an economy? As in many cases, the private sector approach hints at a way to improve management in the public sector. Eco-efficiency concepts and indicators are promoted by the World Business Council on Sustainable Development, and are applied by companies to gauge the environmental sustainability of their operations. Higher value-added or unit production per unit of waste produced, is the sign of a more environmentally sustainable operation.

The Resource Efficient and Environment Friendly Index of China is an interesting example of one Government's attempt to measure eco-efficiency and to set targets using the indicators it has developed.[4] Its 11th Five-year Plan (2005), the Government of China set targets for a more eco-efficient economy. Among other ambitious eco-efficiency goals, China plans to reduce by 2020 (compared to 2000 levels):

- Energy intensity (energy used per unit GDP) by 50 to 60 per cent
- Water intensity (water used per unit of GDP) by 80 per cent
- Sulphur dioxide (SO_2) intensity (SO_2 emissions per unit of GDP) by 75 per cent
- Carbon dioxide (CO_2) intensity (CO_2 emissions per unit of GDP) by 60 per cent

ESCAP has taken steps to define eco-efficiency indicators that can be used to monitor trends in economic growth. It is also exploring how such indicators can be applied to assess the environmental sustainability of infrastructure. Some key questions addressed by these projects are described below:

- How is eco-efficiency measured? What indicators can countries use to measure eco-efficiency?
- Is infrastructure becoming more or less eco-efficient? Is infrastructure delivering more services per
  unit of environmental impact?
- Does the fiscal system adequately facilitate improvement in the quality of consumption?
- Are consumption patterns becoming more eco-efficient as incomes rise?
- Are businesses actively engaging in practices that lead to more eco-efficient production and consumption?

Even in the rural sector, eco-efficiency concepts are highly relevant. The international commitments to sustainable development were reviewed at the Asia-Pacific Regional Implementation Meeting in November 2007.[5] The meeting concluded, inter alia, that the next agricultural revolution would be based on the efficient use of agricultural inputs (including energy, water and land) rather than agricultural practices which had resulted in significant pressures through the intensive use of inputs such as mineral fertilizers and pesticides as well as irrigation support based on inefficient irrigation systems. This was described as the major challenge facing the Asian and Pacific region in view of its limited resource base and the significant and unsustainable environmental pressures exerted by increasingly intensive farming.

Environmental sustainability vis-à-vis environmental performance

In general, Governments have strengthened environmental legislation and institutions geared towards managing pollution and achieving, in as short a term as possible, specific environmental goals. Pollution control, particularly that of production activity, has been the main focus.

However, continuing environmental threats, such as the disappearance of natural forests and the rising volume and changing nature of waste, are evidence that the increase in environmental pressure due to expanded consumption and production activities is not being addressed successfully. Achieving eco-efficient economic growth means rethinking the approach to managing environmental issues.

As pointed out in the State of the Environment in Asia and the Pacific 2005 published by ESCAP, "the premise that sustainable development can be achieved by improving environmental performance may be creating a false sense of security and is distracting attention from the critical need to improve the environmental sustainability of economic growth patterns".[6] Pollution control efforts that focus on end-of-pipe solutions and do not look at the entire life cycle of a production process contribute little to reducing the long-term environmental impacts of the production process, which extend beyond the factory site.

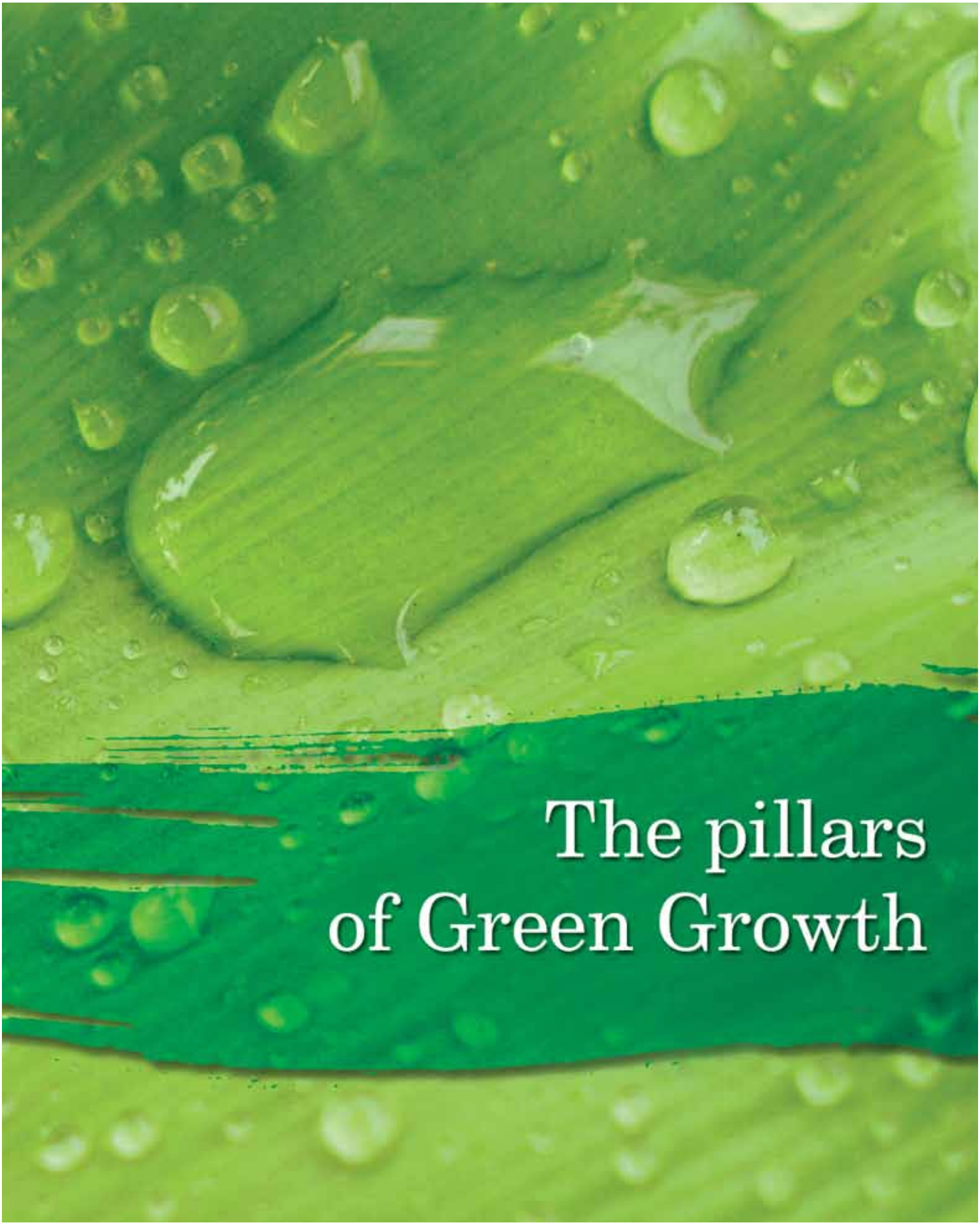
"Environmental sustainability" as applied to economic growth refers to the capacity of economic growth processes and social change to ensure that natural resources are not depleted faster than they can be regenerated and that ecological systems remain viable. Economic growth must stay within existing carrying capacities. Mounting environmental pressures cannot be handled successfully, through a sole focus on improving environmental performance. A closer look needs to be taken at the environmental sustainability of an economic system. Table 1 compares the key differences between these two concepts.

Action to improve the environmental sustainability of Asian and Pacific economies will lead to improvements in environmental performance. However, the reverse is not necessarily true in the long term. Long-term success in tackling the region's mounting environmental pressures requires a focus on policies that develop economies that are progressively more environmentally sustainable and that apply whole-system approaches

Table 1 : Environmental sustainability vis-à-vis environmental performance

	Environmental performance approaches	Environmental sustainability approaches
Planning and policy perspectives	Short- to medium-term perspectives	Long-term perspectives
Intervention in systems that impact on the natural environment	Focus on improvements to existing modalities of consumption and production and end-of-pipe solutions	Seek fundamental changes to patterns of socio-economic activity (consumption and production) to make them more eco-efficient Seek to improve decision-making processes that impact on the use of natural resources
Scope of responsibility	Mainly implemented by government agencies and private sector units responsible for environmental management	Require the involvement and support of all government agencies, the private sector and the wider society
Measures and indicators	Use traditional measures and indicators of environmental quality – e.g. extent of forest area, concentrations of pollutants	Seek to determine the impact of patterns of natural resource use by focusing on the linkages between the use of environmental goods and services and anthropogenic activity: for example, eco-efficiency of use of ecosystem goods and services (e.g. total material flows per unit of GDP, and pollution produced per unit of production)

Source: ESCAP (2006). State of the Environment in Asia and the Pacific 2005 (New York, United Nations).


The pillars
of Green Growth

··· pillars of green growth

- Eco-tax reform
- Sustainable infrastructure
- Greening of business
- Sustainable consumption

Can current economic and pricing systems (the software of the economy) and the physical expressions of economic growth manifested in the trade in goods and services as well as patterns of infrastructure development (the hardware of the economy) produce new environmental outcomes? It is unlikely, even with the best pollution and waste control measures in the world.

Where economic growth is determined by market forces, and market forces do not take into account environmental costs, environmental protection is doomed. Climate change is the most prominent example of such market failure. Eco-tax reform (ETR) uses fiscal policy measures to steer economic burdens away from economically beneficial activities (such as employment) towards environmentally harmful activities (such as the generation of pollution). With this approach, decision-making at every level, by the individual in society up to the highest national Government forum, is steered towards minimizing the environmental impacts of growth.

Sustainable infrastructure development is a critical focus of green growth. While infrastructure expands, it locks economies into specific patterns of resource use (such as energy) for decades into the future. In Asia and the Pacific, where there is rapid urbanization and significant shortfalls in almost every kind of infrastructure, investments in infrastructure may be turned into investments in environmental sustainability and an opportunity to build more sustainable economies.

Another aspect of the hardware of an economy is the production and consumption of goods and services. The rate at which these goods and services are produced, and how they use environmental resources and services (as raw materials in their production, as inputs to their operation, or as waste sinks) are critical sources of environmental pressure. These pressures are growing with the rise of the consumer classes and the growing power of Asia and Pacific as an engine of the world economy. The greening of business and sustainable consumption remain the core prerequisites for meeting both human welfare and environmental protection needs.

Eco-tax reform

ETR, also known as green tax and budget reform, is a powerful policy tool for building more effective, efficient, socially beneficial and environmentally sustainable fiscal systems and economies. Its key principles are the internalization of environmental costs in the market and revenue neutrality, that is, green taxes should not pose an additional burden.

How can the promise of ETR be turned into a reality for more countries?

The unfulfilled promise of the market

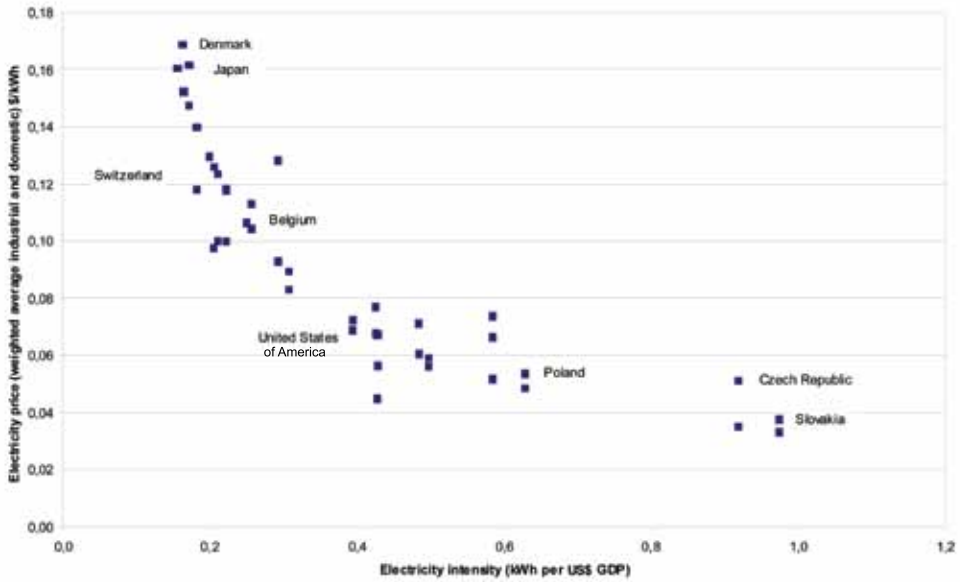
The 2005 Millennium Ecosystem Assessment[6] showed unequivocally that the natural capital on which the world's economies and societies depend is highly degraded, making the majority of these economies unsustainable at the current rates of resource use. Yet, even after the release of this landmark report, few economies have adapted their patterns of growth to reflect such limitations.

Prices are the software of societies and economies; they influence spending and investment behaviour and are therefore powerful tools for determining patterns of economic growth. Market prices do not usually reflect ecological costs, so while decisions made on the basis of market prices may be economically expedient, they will not be ecologically efficient that is, they will not minimize ecological costs while maximizing economic benefit.

A pricing policy that helps prices "to tell the truth" about environmental and social costs can reduce the environmental pressure exerted by each transaction in an economy, whether it is deciding how to get from home to work, or designing a building.

In his 2003, research paper, A. Verbruggen compared electricity prices and electricity intensities (electricity used across each economy, per unit of GDP earned) and revealed a neat curve (see below).[7]

Figure 3 : Electricity price and electricity intensity



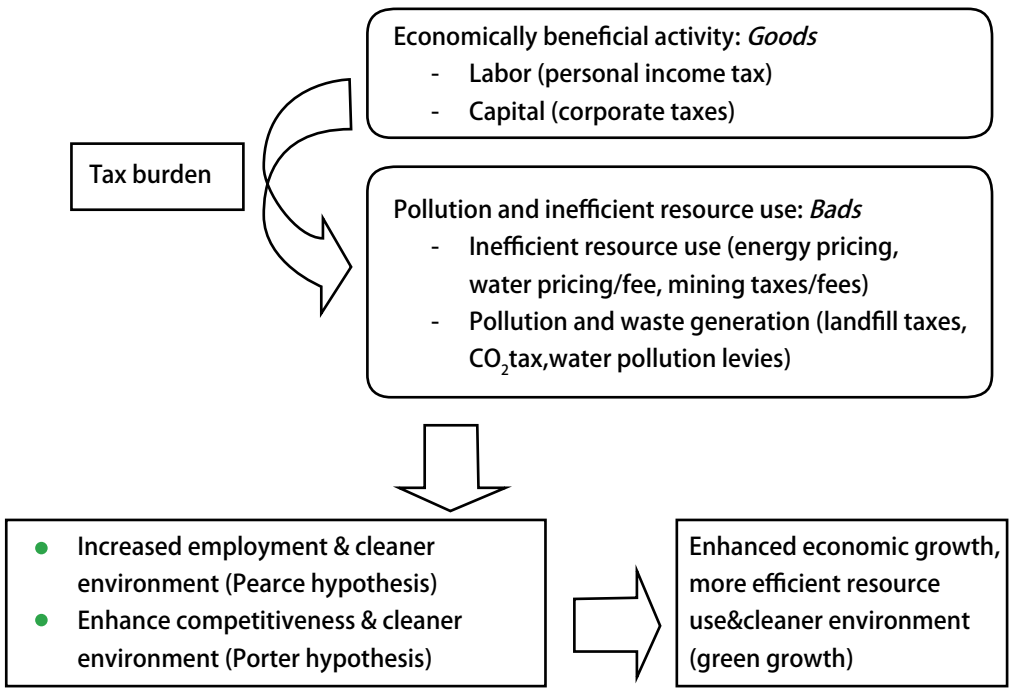
Source: A. Verbruggen, "Statemate in energy markets: supply extension versus demand reduction", Energy Policy, vol. 31, No. 14 pp. (2003) 1431-1440.

At the top end of the curve lay the countries with high energy prices and low electricity use per unit of GDP (electricity intensity), typically high-income countries. At the low end of the curve lay the countries with very high electricity intensities and very low electricity prices. In the middle of this curve lay a few surprises: countries such as the United States of America showed higher electricity intensities than expected for expected for their stage of development. Every unit of GDP earned by the United States of America required twice as much electricity as those of countries such as Denmark and Sweden.

The distribution represents the evidence that higher energy prices encouraged the development of energy-efficient economic structures without precipitating economic disaster. The economies of countries that had the highest energy prices were, in fact, among the most stable in the world. In addition, they were known for their achievements in socio-economic development, as measured by the human development index.

Energy pricing that steers the consumer towards more efficient energy use patterns is a standard instrument in environmental tax reform. When environmental taxes are applied in a revenue-neutral approach to ETR, they become a powerful tool for achieving both economic growth and environmental protection objectives (see figure 4).

Figure 4 : Eco-tax reform and green growth



Tax the "bads" not the "goods"

In 1993, the European Commission took an in-depth look at the future challenges it faced and assessed how prepared the economic bloc was to deal with them. The Commission concluded that there had been "an insufficient use of labour resources and an excessive use of environmental resources."[8] High taxes on the use of labour in the corporate sector and low or zero taxation on pollution and resource use had led to the inefficient use of both labour and environmental resources as well as to undesirable economic, social, and environmental outcomes.

The recommendation was to reverse the situation in a revenue-neutral way: to shift the tax burden towards the "bads", and away from the "goods". Reduced taxation on employment, for example, and increased taxation on pollution, or resource use would simultaneously stimulate employment and encourage more efficient resource use as well as cleaner production and consumption activity. ETR was on its way. Leading this shift were the Nordic countries region, followed by the Netherlands and other countries in the European Union.

The ETR leaders in Western Europe are Sweden and Germany. In 1991, the Government of Sweden considerably reduced income taxes to tackle the unsustainable social welfare system, which provided the Government with a political opportunity to increase energy taxation.[9]

Germany adopted a four-year ETR plan in 1999 and systematically shifted taxes from labour to energy. By 2001, the use of fuel had declined by 5 per cent and the renewable energy sector had experienced accelerated growth. By 2003, 45,400 permanent jobs had been created in the wind industry alone, and this number is projected to rise to 103,000 by 2010.[10]

Reform

Government officials responsible for fiscal policy who have participated in events on green growth organized by ESCAP and partner institutions,[11] heard that ETR was not just about raising new taxes.

A key principle of ETR is revenue neutrality, that is, the redirection of taxation and burdens from socially beneficial activities (for example, employment) towards environmentally harmful activities. Budget allocations could also be revised to support such taxation reform by, for example, by increasing investment in mass transit infrastructure to make it viable for people to leave their cars at home. The goal is a net zero increase in the tax burden, but a positive impact on employment and polluting behaviour through the market. Table 2 shows how several countries put this principle into practice.

The principle of revenue neutrality is important for the political acceptability of ETR initiatives; a lack of acceptability can prove to be a major stumbling block. For successful implementation, ETR also requires flexibility in the use of income from environmental taxation.

The fiscal system ETR creates is not only more rational, but it can be cheaper as well. Gasoline taxes, for example, have been found to be potentially more socially beneficial and less expensive to administer than labour taxes.[12]

A range of environmentally beneficial economic instruments can be applied in ETR, including product fees, emission and user charges, and the removal of subsidies currently provided for the use of various types of resources.

Table 2 : Revenue neutrality in eco-tax reform

	Start year	Taxes raised on	Tax cut	Magnitude
Sweden	1990	CO_2 SO_2 Various	PIT Energy taxes on agriculture Continuous education	2.4% of total tax revenue
Denmark	1994	Various[1] CO_2 SO_2	PIT SSC Capital income	Around 3% of GDP by 2002, or over 6% of total tax revenue
Netherlands	1996	CO_2	CPT, PIT, SSC	0.3% of GDP in 1996, or around 0.5% of total tax revenue
United Kingdom	1996	Landfill	SSC	Around 0.1% of total tax revenue in 1999
Norway	1999	CO_2 SO_2 Diesel oil	PIT	0.2% of total tax revenue in 1999
Germany	1999	Petroleum products	SSC	Around 1% of total tax revenue in 1999
Italy	1999	Petroleum products	SSC	Less than 0.1% of total tax revenue in 1999

1. (Gasoline, electricity, water, waste, cars.) PIT is personal income tax, CPT is corporation tax, SSC is social security contributions. In 1996, the Netherlands introduced a CO_2 tax and made cuts to personal and corporate income tax, and social security contributions largely to increase public acceptability of environmental tax (rather than to address market inefficiencies perse in the labour and capital (saving) markets)

Source: Benoit Bosquet "Environmental tax reform: does it work? A survey of the empirical evidence", Ecological Economics, vol. 34, No. 1 July 2000, pp.19-30.

A progressive fiscal system would employ appropriate instruments in a long-term plan to decouple economic growth from environmental degradation. It would also ensure budgetary support by encouraging increased investment in research and development, the provision of infrastructure and technology, as well as capacity-building activity. An even more progressive and innovative fiscal system would provide incentives for investment in ecosystem services that produce the resources necessary to maintain economic systems, such as energy from renewable sources and clean water.[13]

Stimulating growth and improvement in human welfare through ETR

The mantra of ETR proponents is the "double dividend" – benefits that accrue to the economy, society and the environment simultaneously, but it can be a hard sell. For example, Governments at the ESCAP and Korea Institute of Public Finance Second Roundtable Workshop[14] expressed concern that ETR initiatives could harm economic growth prospects in developing countries, and thus posed a major policy gamble.

Information presented at the workshop suggested otherwise. An economy that uses energy and other resources in a frugal way is far less likely to suffer the shocks of rising energy-prices than an economy that is energy- and resource-intensive. ETR is an investment in economic stability. If implemented in a strategic manner that allows for gradual and economically tolerable shifts in consumption and production behaviour, ETR can reduce the long-term impacts that the already rising costs of energy, raw materials and other inputs will have on the economy. In short, it is a global competitiveness strategy for the businesses of a nation.

A workshop presentation by Mr. Paul Ekins, former head of Environment Group at the Policy Studies Institute, described climate change agreements that were made with energy-intensive industries in the United Kingdom of Great Britain and Northern Ireland. The agreements were to temper the hostile response of the country's industries to proposed climate change levies. Whilesuch levies taxed energy use industry, commerce and the public sector (and were offset by cuts in employers' National Insurance contributions), the agreements allowed energy-intensive businesses reductions of 80 per cent on the levy in return for meeting energy efficiency or carbon saving targets. Fifteen industries (one third of those that signed the agreements) met their 2010 energy-efficiency targets in 2002. This indicated that the low prioritization of energy-efficiency, rather than the cost of such efficiency measures, was the main reason companies had failed to act.

Green taxes have increased the competitive edge of German companies in the European market, attracted more investments, stimulated innovation and created new jobs. However, the experiences of countries that have engaged in ETR show that the fabled double dividend is usually quite small in net terms. In short, such reform is likely to have positive benefits for the economy and the environment, but "don't expect miracles".

Thai policymakers are grappling with the issue of determining the appropriate levels of environmental taxation. At the Second Roundtable Workshop, they heard that the prospects for winning the golden double dividend varied from country to country and depended on the structure of relative preferences (that is the demand elasticity for "dirty" goods and resources), the infrastructure available, the levels of investment in environmental research and development, and distortion caused by non-environmental taxes.

It was also stressed that there was no point in trying to push consumers towards environmentally friendly consumption patterns when alternatives are non-existent, too expensive or limited. The example of mass transit was given. A fuel tax to coax consumers to use modes of transit that are less energy intensive should be supported by improvements in mass transit infrastructure. Part of the success of the congestion charges in London was the investment in the bus system improvements prior to instituting the charge.

Policymakers also discussed the social welfare aspects of ETR. Taxes based on the consumption of goods and services (such as energy and water) can, depending on the tax structure, weigh heavier on the poor than on the wealthy (as a percentage of income) and are therefore termed income regressive.

How do we make consumption-based taxes work for the economy and the environment without unfairly burdening the most vulnerable in society? A key feature of ETR is the employment of mitigation measures, such as alleviating the tax burden for certain income groups and providing compensation in the form of transfers or rebates.

Another approach taxes excessive consumption, that is, only after reasonable consumption levels have been exceeded. Singapore offers an example of how this can be done in the often controversial issue of water pricing. In 1994, the per capita water consumption of Singapore residents was 176 litres per year. By 2005, this had dropped by 10 per cent, to 160 litres per year. This was achieved by applying a water conservation tax and an increase in water tariffs that raised the price of water by about 50 per cent. A hallmark of the Singaporean water conservation system was that water prices escalated only when water consumption passed a specified threshold.

Two additional points are important to consider when discussing the impacts of ETR on welfare. The first is that the burden is not always placed on the poorest. For example, wealthier residents of urban areas may pay more than rural residents if a traffic congestion tax were introduced. The second is that the discussion on social equity issues should not be limited to identifying who pays more, but should also answer the question: Who benefits more? The arguments in favour of green taxes gain weight when their indirect benefits are considered. An environmental tax that results in air pollution improvements will have the most benefit for those who spend the most time outdoors; those who cannot afford air conditioning, which can reduce exposure to air pollution; or those who cannot access health care when respiratory illnesses threaten. In general, environmental degradation first impacts the less influential in society; environmental improvements are therefore most beneficial to the very groups who are often identified as paying the most when environmental taxes are introduced.

What other advice did the experts at the second Roundtable Workshop have for countries?

Ensure political acceptability

The losers shout louder than the winners, and the squeaky wheel gets the oil. The political presentation of ETR has proven to be very important to reform success. People and companies accustomed to free or inexpensive resources can scuttle even the best-designed ETR schemes by objecting to price increases.

The riots in response to energy price increases in Indonesia, Myanmar, the Philippines and Thailand in recent years are indicative of the passion that can be aroused by increasing the prices of goods used in daily life.

Resistance to such increases is not restricted to the developing world. An escalating fuel tax introduced in the United Kingdom gradually increased fuel prices from the early 1990s to 2000. By 2000, public outcry overturned the tax, and prices quickly returned to the levels of 10 years earlier, despite the increasing energy costs. Investments in greater efficiency had not been sufficient. While income tax cuts were introduced at the same time as the escalating fuel tax, policymakers did not explicitly link the reduced income tax burden to the increasing fuel prices. In the minds of the general public, therefore, the fuel tax was extra the revenue-neutrality of the reform process had not been communicated. The opportunity to make inroads into fuel efficiency was therefore missed.

Make a plan and stick to it

Industrial innovations that support positive environmental outcomes require stable, long-term policy environments in order to flourish. In Asia and the Pacific, leaders businesses are increasingly asking Governments the following: "What are you planning to do about environmental issues?" "When you decide, what you are going to do, are you *really* going to do it?"

These are valid questions. Businesses make long-term plans regarding the allocation of investment in capital and therefore require a high degree of certainty regarding environmental policy direction in order to be prepared.

In one country in South Asia, businesses lobbied for the inclusion of pollution taxes in tax reforms. While these were successfully codified in law, they were never implemented, leading to confusion among Government ministries, disappointment on the part of the companies that invested in pollution control improvements, and secret elation among the "dirty" producers.

Avoid the anti-environmental tax

ETR must be seen as far more than a convenient way of raising additional revenue for the Government under the guise of the "polluter pays" principle.

One country in North-East Asia has one of the highest fuel prices in the world, and one of the highest proportionate Government revenues from fuel taxation. Fuel taxes, under the right conditions, can be good examples of environmental taxation. The revenues from such taxes in this country are fed back into road and highway development projects, rather than channeled to mass transit infrastructure development. Instead of reducing fuel consumption, the fuel tax revenues therefore can be said to encourage fuel consumption. A fuel tax designed simply to provide the infrastructure for consuming fuel is not an environmental or green tax and cannot be expected to shift the economy to a more sustainable performance level.

This is one example of the need for coherent support across Government fiscal systems. Such taxes can be used in economically beneficial but environmentally harmful ways, consequently turning an environmental tax into an anti-environmental tax.

In conclusion

Several countries, including China, Japan, the Republic of Korea and Thailand, have made tentative steps, but still have a long way to go. ETR represents a powerful application of fiscal policy that is relevant even in developing countries. In Asia and the Pacific where income taxation efficacy varies from country to country, and the informal sector constitutes a large proportion of economic activity, individual income tax may not serve as a basis for ETR. However, other opportunities can be identified, taking into account specific taxation contexts to avoid excessive penalization of specific sector; for example, higher energy prices and pollution taxes may be offset by reducing corporate taxation for certain energy - or pollution-intensive industries.

Sustainable infrastructure

Green building design can reduce energy and water use by human settlements by more than 30 per cent over the lifetime of the structure; this does not take into account the potential savings from applying eco-efficiency concepts to all types of infrastructure development. The resulting savings in building operation and infrastructure development costs can help a nation's products and services become more cost-competitive in the global marketplace.

Given that Asian and Pacific urban populations are projected to increase by about 352 million people between 2005 and 2015, substantial resource savings could be generated by focusing more attention on sustainability in infrastructure development.

Infrastructure development – "hard-wiring" consumption patterns

Infrastructure development patterns are the most important, but least recognized, determinants of the consumption patterns of a country. As cities grow upwards and outwards, highways lengthen and water, energy and sanitation services are expanded to people who do not yet have the basic requirements for a good quality of life, the region's growing populations are locked into energy and water consumption patterns determined by the infrastructure through which these services are delivered.

The spectres of climate change and growing resource scarcity suggest that policymakers and planners who are now accountable for only the capital costs of a building, a transportation system or a new urban centre when it is constructed should also be accountable for the social, resource-use, pollution and environmental costs over the lifetime of the infrastructure, far into the future.

The potential savings are substantial. An investment of about US$100,000 to incorporate green building features into a US$5 million building would result in savings over 20 years of US$1 million.[15] While buildings typically operate for over 25 years, a report for the Packard Foundation showed that building life increased with its "greenness". Aside from the cost savings from reduced energy and water use and maintenance, most of the benefits of green buildings can be measured in terms of worker health and productivity.

The difficulties that decision makers face in meeting the challenge of sustainable infrastructure development are not simply a matter of a lack of finances. Even where there are no financial constraints, significant and chronic shortcomings with respect to eco-efficiency, social inclusiveness and disaster risk management are observed often from the inertia of doing things "the way they've always been done", a lack of incentives or a lack of knowledge about sustainable design possibilities.

A basic question that should be answered is: what is sustainable infrastructure development?

Sustainable infrastructure development – eco-efficiency as a basic principle

Buildings are already responsible for about 75 per cent of GHG gas (mainly CO_2) emissions. Addressing this source is therefore important to climate change mitigation. Climate change adaptation entails improving energy and water efficiency in response to the projection of scarcity of these resources and the resulting impacts. Such impact include the heat island effects, in which urban temperatures rise due to the thermal properties of the built infrastructure and energy use.

People transporting themselves (and needed materials) to the building can use more energy than the building itself does. Therefore, building location decisions are equally, if not more, important to sustainable infrastructure development than building design.

There are tremendous opportunities to improve the performance of built environments in developing countries that are in the process of improving, renewing and extending their infrastructure.

Improving sustainability in infrastructure development requires explicit attention to eco-efficiency, achieving more with less consumption of resources (energy, water, land and raw materials) and production of pollution (such as CO_2, SO_2, nitrogen oxides) over both the construction and usage phases of infrastructure. Concepts and tools such as material intensity per unit of service and material flow analysis can help determine resource consumption in the delivery of infrastructure services in order to measure eco-efficiency. These concepts help focus infrastructure decisions on eco-efficiency criteria and achieve the necessary paradigm shift in thinking and practice.

Box 1 : What is sustainable infrastructure?

Sustainable infrastructure should:

- *minimize resource use and ecological impacts throughout the life cycle;*
- *preserve ecosystem integrity;*
- *not aggravate adverse global phenomena as climate change and ozone depletion;*
- *deliver economically viable goods and services;*
- *maximize long-run economic growth for the benefit of all;*
- *be financially viable;*
- *be managed and operated in a sustainable way;*
- *be socially inclusive;*
- *contribute to reducing poverty;*
- *contribute to meeting the MDGs;*
- *be appropriate for the stage of development and context; and*
- *be accepted and supported by the general population*

Source: Report of the ESCAP Expert Group Meeting on Sustainable Infrastructure Development in Asia and the Pacific, 11-13 June 2007, Bangkok, Thailand

More research on measuring the eco-efficiency of infrastructure is needed, and will be addressed by ESCAP activities in the areas of both eco-efficiency indicators and sustainable infrastructure.[16] However, eco-efficiency concepts are already being applied in financing decisions at some agencies.

Agence Française de Développement (AFD) factors environmental sustainability into its investment decisions. The results its these calculations are compared to other environmental, economic and social indicators and, depending on the primary objective of the project and possible alternatives, decisions to invest or not are taken. Such indicators remain rough, but nourish dialogue with the countries in which AFD invests and informs AFD investment policy. Experimenting with this approach has shed light on the sometimes vague concept of energy efficiency. It has also led AFD to approach biofuel projects very cautiously and to rank electrified public transportation systems according to the carbon intensity of the grid.[17]

Maximizing service delivery while minimizing environmental impact

In 2007, ESCAP convened a diverse group of experts and practitioners at the Expert Group Meeting on Sustainable Infrastructure Development in Asia and the Pacific in order to define what constitutes sustainable infrastructure development. They agreed that it is about maximizing the service delivery of the infrastructure while minimizing the negative environmental impacts.[18]

This requires a closer look at whether infrastructure development objectives are expressed in terms of the problem that they are intended to solve (the lack of accessibility) or in terms of the solution that finds the greatest support in the most powerful sectors of society. Are the right questions being asked when infrastructure development decisions are made? For example: "How can we enable all or most people to move to the places they need to get to in a timely way?" rather than "Is there enough space for the cars?"

A focus on sustainable infrastructure is therefore not only about reducing environmental impacts; it is equally about maximizing service delivery to all people in a way that enhances economic and social and economic performance. It is therefore more likely to result in infrastructure development patterns that are people-focused rather than narrow and solution-focused.

Infrastructure development in the ancient city of Bangalore, India has been described as typical of unsustainable infrastructure development, with road-widening and other infrastructure projects resulting in a city that is quickly losing its charm and marginalizing poor pedestrians and bicyclists.

Further along in its growth path, the city of Seoul has reversed this process to restore the Cheonggyecheon River by removing an overhead highway. Although the project cost as much as US$386 million and resulted in social conflict and the displacement of businesses, it is creating an oasis in the city, which has had economic benefits for both small and large enterprises.

Following the success of bus rapid transit in Curitiba in Brazil and in Bogota, such systems have become a major focus for sustainable transport development in cities such as Jakarta and Bangkok. However, initial experiences in these types of projects have shown that providing the physical infrastructure does not always easily translate into increased ability to move from one point to another via public transport.

Forward-thinking planners are now proposing that accessibility, rather than mobility, needs to be the goal of transportation infrastructure. The dimensions of accessibility include:

- Socio-economic accessibility: Are infrastructure solutions affordable for all or most groups?
- Socio-cultural accessibility: Are mobility solutions provided in a culturally appropriate way? Can all persons of various socio-cultural backgrounds (differentiated, for example by gender) equally access the services? Do the solutions reflect prevailing lifestyles?
- Institutional accessibility: Are the solutions geared towards facilitating access to key institutions in society (for example government offices, schools, hospitals)?
- Physical accessibility : Are mobility solutions accessible to those with physical limitation, for example?

It is becoming increasingly important that transport planning incorporate an "accessibility-based analysis which evaluates the transport system based on people's ability to reach desired goods, services and activities".[19] When designing, planning and implementing infrastructure development based on this perspective a wider range of solutions and stakeholders is considered; a wider range of policy, institutional and legislative tools than would conventionally be considered is therefore employed.

Decision makers who learn firsthand the difference between mobility and accessibility can make a tremendous impact. In the late 1990s, an ESCAP project to promote accessibility of infrastructure for persons with disabilities placed Bangkok Metropolitan Authority planners in wheelchairs or blindfolded them, and challenged them to get around using non-accessible infrastructure in the city centre. This resulted in increased access for disabled persons in several areas of Bangkok, particularly in public areas. It would seem to follow that, if transportation decision makers were challenged to do without cars for several days during a normal schedule involving both work and domestic routines, better solutions for accessibility would be found.

Providing incentives for sustainability: accessibility, service delivery, eco-efficiency

Policy tools such as strategic environmental assessment, integrated policy analysis, multi-criteria analysis, social cost-benefit analysis, life-cycle assessment, material flow analysis, and risk assessment and management can help to improve infrastructure planning for greater sustainability. Innovations such as biomimicry, or using natural systems to inspire infrastructure design with low operating costs and low environmental impact, can radically improve eco-efficiency. However, these promising policy tools and design innovations are not widely used. There must be more incentives.

Apart from the "experiential" approach described above, how can planning that increases accessibility and improves service delivery for all forms of infrastructure be "incentivized"? One paper submitted to the ESCAP expert group meeting pointed out that the existing incentives for government staff did not motivate decision makers to seriously factor in sustainability.[20] On an individual level, it is often far more career-boosting to deliver massively expensive highway systems than potentially less expensive and more eco-efficient bus rapid transit systems.

If eco-efficiency objectives are not coherently reflected in measures of individual success as well as government sustainability priorities, it will be difficult to make any headway. Countries often measure their infrastructure development successes in terms of growth in total expenditure over time, or the percentage of GDP that infrastructure expenditure represents, rather than in terms of increases in the numbers served by public transportation, reduction in CO_2 emissions per passenger kilometre traveled or other indicators of eco-efficiency.

Supportive fiscal policy is essential. Two examples from Queensland, Australia, provided at the ESCAP forum demonstrated the influence of fiscal policy on land use and, therefore, the eco-efficiency of infrastructure. Taxation is used to fund infrastructure development, but it also provides landowners with important incentives and disincentives for specific kinds of land use. Where land use in areas close to already-built infrastructure is more heavily taxed, the tendency will be to develop land further away, and so require yet more infrastructure development. Where developers receive tax incentives for developing in non-developed areas (for example in greenfield developments such as new subdivisions or industrial facilities on the outer fringe of the city) rather than in areas already served, even more infrastructure requirements are created. Few Governments have performed the sophisticated analysis of the short- and long-term fiscal impacts of land use patterns, though progress is being made. Generally, sprawling development into greenfields incurs government infrastructure costs far in excess of revenues.[21]

The way that budgets are allocated is also important. If funds are allocated to activities (for example, to building roads) rather than to improving accessibility (for example, to schools and key concentrations of employment centres) there are no incentives to produce innovative solutions that promote accessibility over specific infrastructure types.

Participants at the ESCAP expert group meeting stressed that a strong bottom-line argument for sustainable infrastructure was necessary to achieve a mindset shift in such development. It was, they felt, crucial to show that sustainable infrastructure represents a better-performing, lower risk investment, which has a positive impact on returns. For example, tender evaluation processes for large public buildings or developments are usually based on the physical costs of the proposed development, and the lowest bidder wins; the operational costs of the development over its lifetime are not usually considered in this evaluation. There is little or no incentive for developers, therefore, to reduce operational costs by making upfront investments in better design.

Solutions to this inefficient process include providing designers of buildings and infrastructure with direct financial incentives to exceed established performance standards for example, royalties throughout the life of the building or infrastructure from the energy, water or other savings that are achieved. This also helps ensure that sustainable designs actually perform in reality rather than just on the drawing board.

Investment and financing

Investment and financing strategies that focus on environmental sustainability and social inclusiveness must look closely at where the money is coming from, how it is collected and whether the way is raised and spent is supportive of sustainability objectives. The previous section on ETR showed the example of a country that collected a fuel tax as a kind of environmental tax, but then used the tax to build highways, rather than investing it in public transportation projects that improved sustainability performance.

The financial viability of infrastructure development is always a concern. In Thailand, Bangkok's Municipal Rail Systems have run at a slight revenue loss, despite being at full commuter capacity at peak travel periods, like many transportation projects. Subsidies from sources such as fuel taxes or road pricing schemes could supplement the operating costs of such projects, as well as other modes of public transport, such as segments of the bus system that fall under the control of the Bangkok Metropolitan Authority. In a sense, by supporting the improvement of public transport service delivery, those who opt to drive would be paying public transit users for not driving who would, in turn, be avoiding the consequent resource use and polluting inefficiencies.

In State of the Environment in Asia and the Pacific 2005, corporate finance expert, William Byun points out the "enormous" opportunities in using the clean development mechanism of the Kyoto Protocol to the United Nations Framework Convention on Climate Change to support the financing of large scale infrastructure projects that can potentially generate significant certified emission reductions. He highlights large-scale renewable energy development (based on biomass), as a key area of infrastructure development with potential for immediate clean development mechanism financing, particularly in archipelagic South-East Asia, where diesel is the main source of energy for electricity production. One major sourcebook explains how the mechanism can provide much-needed support to partially fund sustainable transportation projects. As of March 2007, one transport project had been registered under the mechanism.[22]

Decentralized service delivery: economic, environmental and social benefits

Approaching infrastructure development from an accessibility-first perspective provides opportunities for socially inclusive infrastructure development, non-State involvement in service delivery and thereby broader-based economic growth that meets needs more efficiently. Communities can themselves become investors in infrastructure development.

Decentralized infrastructure-service delivery, through, for example, through off-grid renewable energy services, small piped-water networks or local feeder bus systems is often promoted as a more environmentally sustainable and socially empowering approach to infrastructure development. Social empowerment facilitates investments from multiple stakeholders and provides livelihood opportunities.

Other benefits include a reduced vulnerability to natural disasters. Mr. David Ness further points out that low technology infrastructure solutions at a local community level, such as the three-wheeled electric vehicles in Kathmandu or solar PV applications in rural areas, present the opportunity for the use of business models that couple increased eco-efficiency with economic and social benefits. For example, solar PV systems may be provided as part of a service by the producer (that is, rental rather than sale) and designed for end-of-life take-back, disassembly, reuse and recycling (creating greater product stewardship).[23]

Another example of the multiple benefits of decentralized service provision can be found in the water sector. For developing countries in particular, the need to expand access to water and energy services in the most cost-effective and efficient way has become urgent. The work of ESCAP in Sri Lanka has shown the potential pro-poor public-private partnership (5-P) models have to (a) expand access to water services, (b) reduce unaccounted for water and (c) be adapted to specific socio cultural and socio-economic situations.

Under this 5-P project, private companies, in partnership with state utilities, provide underserved markets with water, overcoming both the lack of resources faced by public utilities, and the socio-economic and socio cultural barriers (such as secure land tenure or proof of ownership) faced by poor or otherwise marginalized water users in accessing services from more centralized services.

In the energy sector, another ESCAP 5-P project in Indonesia has forged a business partnership between a rural community and a hydropower company. The partnership includes sharing the income from the sales of electricity to the national grid, as well as increased access to electricity for the rural community. The project is being replicated in other countries.[24]

The examples above underline the principle that, in any service delivery system, physical infrastructure is complemented, strengthened and supported when users can be active investors. There is a definite need for social, fiscal and other policies that support entrepreneurs who invest in improving their environmental performance and who cover underserved and often unprofitable areas.

Such policy changes must approach infrastructure development in the context of the wider economy an society. Institutional and legislative support is needed to develop and maximize the synergies between infrastructure development and economic and social systems, particularly in the case of decentralized models of infrastructure development. For example, the Asian Development Bank notes that, to maximize the performance of small piped-water networks, small network service providers should be legalized.[25]

Participants at the 2007 Expert Group Meeting on Sustainable Infrastructure Development in Asia and the Pacific argued that the decentralization of responsibilities without a corresponding decentralization of authority and resources could be "counterproductive and dangerous". Decentralizating service provision, they said, did not eliminate the need for central oversight with respect to performance, safety and access standards, and coordination and planning.[26]

Demand-side management: rethinking unmet demand

In a paper for ESCAP, Mr. David Ness, discusses approaching urban planning as a demand-side management exercise.[27] A reduction in demand for infrastructure development can be achieved by sustainable urban planning that reduces the need for multiple trips by residents. This can occur by, for example, strategically siting complementary or related social services (such as primary schools, health clinics, sports facilities and public libraries), as well as by promoting policies and infrastructure to support telecommuting and e-governance. Doing more business on the Internet can potentially reduce carbon emissions.

Singapore has demonstrated how the demand for infrastructure, and the negative environmental impacts, can be managed by attaching a cost to the use of roads. The country's successful road pricing systems are described in the section on sustainable consumption (page 54).

Electronic Road Pricing (ERP) has changed the way people move about Singapore. The city created a paper-based road-charging scheme in 1975, obliging road users to pay a daily toll when they entered the business area of the city centre. The paper system was subsequently replaced by the more automated ERP system.

Based on the use of a stored-value smartcard and dedicated short-range communication, the system requires all users to install an in-vehicle unit. When the vehicles pass under the ERP gantries, instructions on debiting the prevailing road pricing charges from the stored-value smartcard are sent down to these units. Enforcement is by way of cameras installed on the same gantries. Also, charging has been extended to other congested areas. The policy of Singapore has proven highly successful: traffic speeds have increased by one fifth and congestion has fallen. Over the years, pricing has been adjusted to keep traffic moving smoothly without driving cars off the streets entirely. The system is an improvement over its predecessor, the Area Licensing Scheme. By charging each entry to the central business district, rather than allowing multiple entries for the same charge, ERP has reduced the number of multiple trips into the central business district, which previously constituted about 23 per cent of all trips.

Road pricing does not need to be initially high-tech and high cost to implement. When Singapore introduced road pricing in 1975, it was a developing country without ERP technology. However, it is one of only three countries with such innovative systems today; the others are the United Kingdom and Norway. Many other countries have user fees for specific infrastructure such as bridges, tunnels and special lanes for high-occupancy vehicles.

These measures are, however, politically difficult to implement. The dearth of significant road pricing schemes in most developing countries appears to be linked to the idea that road pricing as a measure to reduce congestion is a detriment to economic growth, particularly in countries with automobile industries.

Sustainable infrastructure and water-resources management

A combination of engineered and natural water capture, storage and treatment systems,[28] may prove more cost-effective, less energy intensive and more socially acceptable than the engineered water supply systems that have become the norm in the western world.[29]

Urban development planning that explicitly takes into account the possibility of water capture can go a long way towards facilitating water recycling. In the context of climate change, where the variability of rainfall is expected to increase, flood mitigation (for example through rainwater harvesting in urban centres) becomes an important infrastructure function. Rainwater harvesting for certain new buildings is now law in the Republic of Korea and in Bangalore, India.

Siting wastewater treatment plants close to the sources of both the water to be recycled and the water to be used increases the economic feasibility of water recycling. Urban stormwater run-off and treated wastewater irrigates public greenery and supplies horticultural and agricultural enterprises in Australia. In the country's dry city of Adelaide, 19 per cent of water demand is met by recycled water.

At the most basic level: building design and building codes

Greener buildings are the basic building block for a more sustainable city. It is predicted that green building initiatives in Singapore will reduce water use in buildings certified under the Green Mark scheme by up to 30 per cent.

In most countries, however, architects work separately from climate control specialists, and architects and building contractors are not provided with incentives for lowering building operation costs. Action in Asian and Pacific countries is restricted by the scarcity of energy-saving materials for construction and by a lack of awareness. Success, however, has been demonstrated by however, Shinawatra University and other entrants in the Energy Efficient Buildings category of the Energy Awards competition organized by the Association of Southeast Nations. Their success in reducing energy use through building design shows that improvements in energy efficiency are feasible, even in developing countries.

Building codes that define a more energy and water-efficient built environment do exist. However, adapting these to national circumstances in a way that supports their practical use is not always successful. While the availability of recommended construction materials has been cited as a barrier, the additional code inspection time is the critical issue in fast-expanding Asian cities.

One solution has been implemented in Singapore, where building-code checking systems integrate the four basic processes of a building life cycle design, procurement, building and maintenance. The application of information technology to the process of checking building plans against building codes can achieve a quantum leap in turnaround time, productivity and outcome quality. The aim is to allow parties in the building sector to communicate and exchange information seamlessly and efficiently.

In conclusion

A few well-targeted policies and initiatives can boost sustainable infrastructure development, even in a developing-country context. However, they require courageous leadership. In 2003, Mr. Ken Livingstone, then Mayor of London, introduced a congestion charge that applied high fees to those driving in the city centre. Despite strident objection from about 80 per cent of London's population, the charge was instituted and resulted in the amelioration of traffic, decreased air pollution and energy savings. He was reelected to another term the following year.

The greening of business[30]

The Third Green Growth Policy Dialogue: the Greening of Business and the Environment as a Business Opportunity, organized by ESCAP and held in June 2007, was attended by business and Government leaders. The Dialogue presented a wide variety of public policy solutions and business practices for the sustainable development of business (the greening of business). The Dialogue focused on the following questions:[31]

- How can ecological efficiency be harnessed as a driver of economic growth and environmental sustainability (reconciling Millennium Development Goals 1 and 7)?
- How can environmental protection and ecological efficiency be presented as a business opportunity, rather than a burden and cost?

The greening of business : changing growth paradigms

High-speed economic development is continuing in the Asian and Pacific region despite increasingly visible signs that the natural capital that underpins wealth creation is rapidly diminishing. The global economy has run an ecological deficit for at least the last two decades, and "red ink" is now flowing freely in the form of reduced wealth creation potential per capita.

Natural capital is both the ecosystem goods (raw materials) that enterprises transform into value for humanity every day (for example agricultural products, water and minerals) and the equally and perhaps more important ecosystem services that make Earth habitable by stabilizing the global climate, cleansing water and air, pollinating agricultural crops, storing nutrients in soils, and supporting spiritual values, cultures and recreation.

Transforming business practices to restore, rather than destroy, natural capital is a critical public policy strategy for sustained prosperity. Great opportunity lies in the promise of sustainable production and consumption by nations and their enterprises, so that they can become more globally competitive. The best managed companies in the world are on this "sustainability journey" and are threatening to leave the others behind.

The competitive advantages of sustainability accrue through the greater efficiency of energy and materials, but equally, if not more so, from enhanced labour productivity. Eighty-seven per cent of Australians and 84 per cent of Chinese prefer to work for a company that "has a good reputation for environmental responsibility".[32] Imagine how unmotivated these people are when working for companies that aren't responsible and imagine what a critical advantage greener companies can achieve by attracting the best talent.

We are fortunate that environmentally sustainable business strategies and techniques translate into short- and long-term global business competitiveness. This is a very "convenient truth", a welcome antidote to the many "inconvenient truths" of the present unsustainability of business-as-usual practices that steadily erode the productive capacity of nations and the Asian and Pacific region. The sustainability race is one to the top that prevents rapid economic expansion from being a "race to the bottom".

The social networks (that is, social capital) that facilitate sustainable business health are rapidly growing and are continually enhanced by public and private institutions such as the Grameen Bank, NGO partnership and sustainability-oriented public programmes. These provide the Asian and Pacific region with substantial opportunities to synergize poverty reduction and environmental protection efforts. There has never been a better time for public policy managers to bring the magic of sustainable business prosperity to their stakeholders.

Business sustainability defined

"Sustainability" for a businessperson has two meanings, both of which are important in order for the business to add shareholder/owner value and social value.

The first meaning of "sustainability" is the traditional one: that the situation can endure over time. It is the desire of every business owner that the business is healthy, growing and enduring. This requires sustained competence in business basics: the global competitiveness of products and services, human productivity, sufficient capitalization and cash flow management.

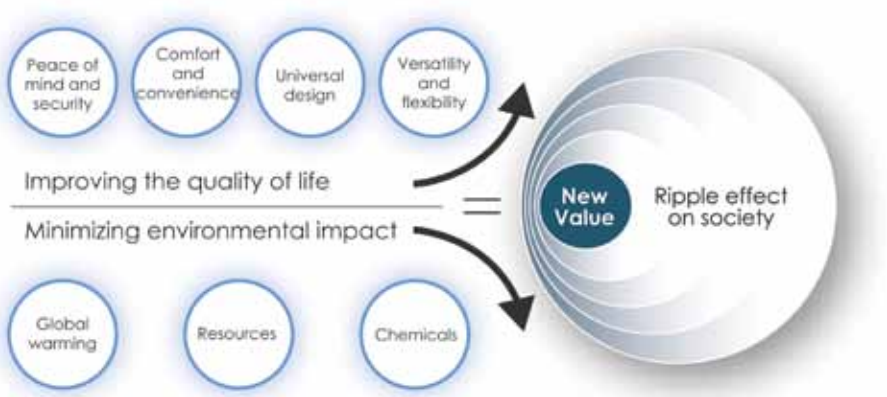
"Sustainability" now also has a second meaning: the alignment of business operations with the sustainable development principle of not impoverishing the next generation by destroying social, human or natural capital.

Natural capital and social capital are closely related, and policies that build or destroy one often build or destroy the other as well, especially in the long run. Building and preserving social capital, as well as human capital (that is, people's skills and education and family stability/health), not only allow people to prosper, or at least to survive, today but also allow people to invest in natural capital rather than simply consume it.

Business sustainability strategies becoming mainstream

Nearly all of the most successful businesses in every sector of the global marketplace have adopted sustainability strategies. They include Wal-Mart Stores, Inc; BP; E.I. DuPont de Nemours and Company (DuPont); Intel Corporation; Sony Corporation; Matsushita Electric Industrial Co., Ltd. (with a brand name Panasonic; see figure 5 and box 2); and Microsoft Corporation. The 2007 "Global 100" most sustainable

Figure 5 : Simultaneous pursuit of environmental conservation and business activities



Source: Matsushita Electric Industrial Co. Ltd. (Panasonic), Corporate Mission. " The Panasonic report for 2007", available at <www.panasonic.com/environmental/csr 2007.pdf>.

corporations in the world include the following well-known companies: BASF#SE Corporation; Genera Electric Company; Hewlett-Packard Development Company, L.P.; Marks and Spencer Ptc; Mitsubishi Heavy Industries Ltd.; Nike Inc.; Nokia Corporation; Koninklijke Philips Electronics N.V.; Ricoh Co., Ltd.; Royal Dutch Shell Ptc.; and Toyota Motor Corporation. These companies are taking whole-system approaches to sustainability, though each uses a different strategy.

Box 2 : Matsushita Group

The Japanese Corporation's Matsushita, which owns six Asian subsidiaries, has long been a sustainability leader in the corporate world. Its first environmental office was established in 1972. In 2000, it began using lead-free solder, and in 2002 it won the grand prize at the 11th Global Environmental Awards.

In 2003, when its Japanese manufacturing units achieved zero waste emissions, the leaders of Matsushita devised a unique corporate mission called "factor X": which is a simple ratio of the "improvement of the quality of life" divided by the "reduction of environmental impact". By 2005, Matsushita was measuring and reducing the amount of its carbon emissions and materials, helping it win first place in the Nikkei Environmental Management Survey. Since 2001, it has been reducing CO_2 emissions per unit of sales by 24 per cent, which is four times greater than its corporate goal of 6 per cent. In 2007, it broke new ground by publishing through monthly (rather than annually or less frequently) reports on its environmental impacts in its "environmental data book".

Matsushita's China operations committed to introducing only "green" products starting in 2007 and improving Chinese factory environmental performance beyond Government standards by 2010. This means (coordinated with China's eleventh five-year plan targets for 2010 compared to those for 2005) reducing CO_2 emissions by 20 per cent and water consumption by 30 per cent per unit of production, achieving a 90 per cent recycling rate, and reducing the total release and transfer of "key reduction-target substances" (chemicals) by 10 per cent. Matsushita meets Global Reporting Initiative standards and reports its CO_2 emissions through the Carbon Disclosure Project. Matsushita's Panasonic manufacturing facility goals include "the creation of true zero emission factories in all aspects – notonly in waste, but also in GHGs, and the use of chemical substances and water during production processes."* The principles of a "love the Earth citizens" campaign, which began in 1998, formed the basis for a Matsushita expertise certification schemes.

Sources: Matsushita (Panasonic),
Matsushita Group, "History of environmental activities", available at <http://www.panasonic.net/eco/ dta_file/milestone.htm>; Matsushita (Panasonic), "Environmental activities – clean factories", available at <http://www.panasonic.net/eco/cf>; Matsushita (Panasonic), "Panasonic announces its*/ declaration of becoming an environmentally contributing company in China", 26 September 2007, available at <http://www.panasonic.cojp/corp/news/official.data/ data/dir/en070926-4/en070926-4.html>.

*/Matsushita Panasonic website, accessed from <http://panasonic.net/eco/ef/in November 2007>.

In Asia and Pacific, business sustainability strategies are developing primarily due to pressures resulting from Government policies, corporate image concerns and increased management awareness as well as media pressure, rather than pressures from consumers or NGOs. One report notes that "corporate social responsibility is developing at an unprecedented speed in China", resulting in 18 reports published in 2006 and more expected in 2007.[33]

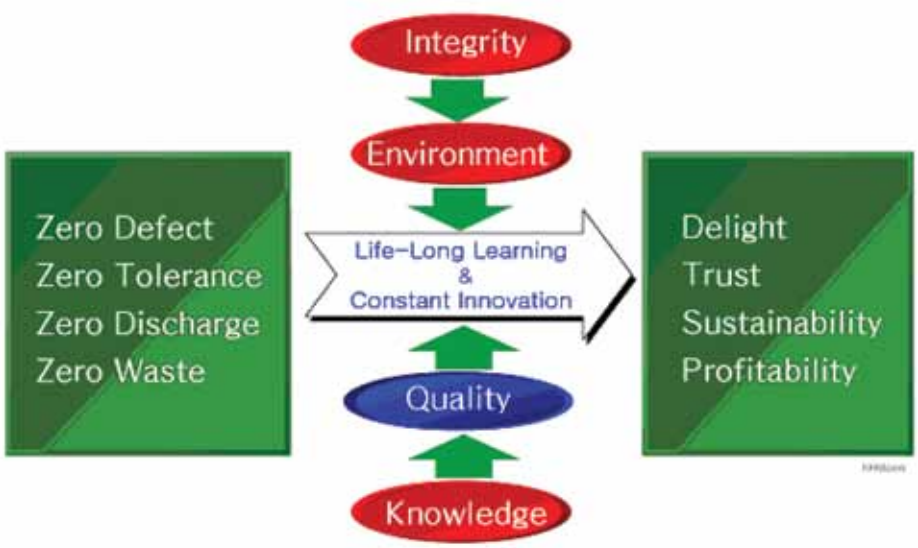
Businesses notable for their efforts in the sustainability in the Asian and Pacific region include Yuhan-Kimberly of the Republic of Korea, which was named the most respected company in the Republic of Korea in 2006 (see figure 6), and MAS Holdings (Pvt) Ltd. of Sri Lanka (see box 3).

These companies demonstrate that sustainability is a successful marketplace strategy today, even with the many governmental policy and marketplace barriers that need to be addressed. However, it is clear that, so long as market prices do not reflect the full social and environmental costs of production and operations, sustainable products will face competitive challenges.[34]

All organizations (for-profit businesses, non-profit enterprises and government operations) face similar challenges in implementing sustainability strategies. These challenges can be summarized as follows:[35]

- Integrating sustainability (long-term social and environmental responsibility) with revenue/profit goals and short-term financial challenges
- Making "sustainability performance" everybody's job
- Allocating capital for both short-term (often "baby-step" and/or symbolic) successes and long-term sustainability performance investments

Figure 6 : Sustainable business mechanism



Source: Yuhan-Kimberly, Republic of Korea, presentation at the ESCAP Third Green Growth Policy Dialogue: the Greening of Business and the Environment as a Business Opportunity, Bangkok, 5 to 7 June 2007.

- Creating an organizational culture that embraces and reinforces sustainability values – usually within a socio-economic environment that has not done so
- Convincing shareholders and other important stakeholders, including employees, that sustainability strategies are critical for the organization's future and are based on sound scientific/economic assessments of the future rather than a passing fad
- Expanding sustainability strategies beyond operations under the organization's direct control to the entire value chain
- Creating sustainability management systems that add more value than their costs of development and implementation (often including third-party auditors)

These practices are often constrained by poor economic, institutional and legislative infrastructure (for example, inflexible or slow regulatory systems, flexible "rules of law", and inflexible regulatory systems not attuned to sustainable business strategies).

Box 3 : MAS Holdings, Sri Lanka

MAS Holdings is the largest intimate apparel manufacturer in South Asia with over 44,000 employees at 28 facilities. It is "committed to ethical and sustainable practices" in the process of striving for balance between "social and environmental spheres and operational excellence" (as stated by Mr. Ravi Fernando of MAS Holdings at the ESCAP Third Green Growth Policy Dialogues: the Greening of Business and the Environment as a Business Opportunity). Its multiple partners include American and European apparel brands and socially responsible retailers such as Marks and Spencer.

As a supplier to Mark and Spencer, MAS Holdings Supports, its strategic sustainability framework, which builds sustainability into its apparel manufacturing processes through sustainable manufacturing, social responsibility and the championing of sustainability.

Mr. Ravi Fernando, Director of Corporate Branding and Strategic CSR of MAS Holdings reports that the company had gained a competitive advantage through a whole-system approach to social responsibility that includes the empowerment of women.

Mr. Fernando urges Governments to promote a mindset of sustainability among citizens and consumers in order to ensure that more sustainable businesses are rewarded in the marketplace. Companies should bear less of the burden for educating consumers to make sustainable choices; if governments help educate consumers about the need for sustainable lifestyles, businesses can then drive environmentally sustainable economic growth, he says.

Source: Ravi Fernando, presentation at the ESCAP Third Green Growth Policy Dialogue: the Green of Business and the Environment as a Business Opportunity, Bangkok, 5-7 June 2007; MAS Holdings website, available at <www.masholdings.com>.

The role of Government

How can Asian and Pacific public policy leaders and implementing (regulatory) officials support enterprises, which are the engine of the region's economy in overcoming these hurdles?

The first step is to fully understand and embrace sustainability strategies as a source of short-term and enduring competitiveness for enterprises, communities and nations. The second is to prioritize fiscal policy and financial innovations, education and other interventions that provide public support and real incentives for sustainable consumption (market stimulation). Third, fiscal policy and financial innovations must provide enterprises with direct support and incentives in making whole-system changes that increase the eco-efficiency of services or product delivery across the entire life cycle. For example, tax breaks for process analysis and improvements should be more readily receivable than tax breaks for end-of-pipe pollution control. Fiscal policy must maximize incentives for sustainably designed products, including the elimination or reduction of research/development cost write-offs unless the costs are for a more sustainable product than what presently exists in the marketplace.

In developing countries in Asia and the Pacific, enterprises need substantial support in making such improvements, and fiscal policy must be supported through special programmes, such as those provided by cleaner production centres established by United Nations organizations in several South-East Asian countries.

A key strategy for Governments in greening businesses is to collaborate with both civil society and businesses, and, when possible, engage the entire society. Corporate ratings disclosure programmes that use simplified ratings of pollution control efforts to publicize corporate environmental performance have successfully motivated enterprise-led improvements in several Asian countries, and have increased public awareness of environmental protection issues.[36]

Social entrepreneurship

In addition, public policy leaders can create favourable policy environments for social entrepreneurship, which is especially important in rural and impoverished communities. Social enterprises can fill the gap between private sector interests (often short-term interests) and Government programmes.

Social entrepreneurs are described by the Schwab Foundation for Social Entrepreneurship as combining the characteristics of successful businessman Richard Branson (of Virgin Group Ltd) with those of the legendary Catholic saint and charity worker Mother Teresa. The Foundation's website states that a social entrepreneur is "a pragmatic visionary who achieves large-scale, systemic and sustainable social change through a new invention, a different approach, a more rigorous application of known technologies or strategies, or a combination of these...with an emphasis on those who are marginalized or poor".[37]

Outstanding examples of social entrepreneurship can be found throughout the Asian and Pacific region. Leading examples illustrating the diversity of Asian social enterprises include Grameen Bank and its subsidiaries (see box 4), Child Helpline International and other enterprises initiated by Ms. Jeroo Billimoria of India;[38] fashion apparel retailer Fair Trade Company, begun by Ms. Safia Minney[39] in 1991 in Japan, and the NGO Bhagwan Mahaveer Viklang Sahayata Samiti the Jaipur foot prosthetics producer, which serves 60,000 patients customers annually.[40]

Box 4 : Dr. Muhammad Yunus, social entrepreneur, Grameen Global Network

In 1976, Economist Dr. Muhammad Yunus, winner of the 2006 Nobel Peace Prize, the Grameen Bank in his native Bangladesh. A source of lending to the poor, Grameen Bank was serving over 2 million borrowers and assisting in various intermediate-technology development by 1994. In 2007, the total number of borrowers reached 7.34 million, of whom 97 per cent were women. The borrowers own 94 per cent of the Bank and the Government the remaining 6 per cent. The loan recovery rate exceeds 98 per cent; all loans are from funds provided by members deposits.

Dr. Yunus and his colleagues, such as Mr. Dipal Chandra Barua, are the most globally recognized champions for social entrepreneurship. The Grameen Global Network now includes 17 companies that operate independently, and 5 companies with financial ties to the Bank, including Grameen Shakti.

Mr. Barua, one of the original Grameen Bank employees, leads the Grameen Shakti enterprise, a growing Bangladeshi: enterprise whose mission is to empower rural people through access to green energy and income. Grameen Shakti provides rural people with solar PV electricity panels (solar home systems), biogas reactors and improved cooking stoves in order to meet the diversified needs of rural people through a whole-system approach (that is, addressing both energy production and energy use). Grameen Shakti has already established 20 Grameen Technology Centers, staffed primarily by women engineers. Microloans to participating households help overcome the high initial costs of the energy systems, and the maximal use of locally made components also contributes to affordability. Through its 1,340 employees at 278 local offices, Grameen Shakti has already supported the installation of 100,000 solar home systems and 1,000 biogas plants that, together, generate 20 megawatts hours per day.

For those who need to support rebuilding efforts after a catastrophe, or who are struggling with other socio-economic challenges, Dr. Yunus advises the creation of a social businesses initiative fund that allocates a portion of the fund for generating innovative ideas.

Source: Dipal Chandra Barua, Grameen Shakti, presentation at the ESCAP Third Green Growth Policy Dialogue: the Greening of business and the Environment as a Business Opportunity, Bangkok, 5-7 June 2007; <www.grameen-info.org>; and David Bornstein, The Price of a Dream: the Story of the Grameen Bank and the Idea that is helping the Poor to Change their Lives (New York, Simon and Schuster, 1996).

The essence of social entrepreneurship support systems is collaboration based on the search for solutions. A leading example is "Health in Your Hands" project of the Global-Public Private Partnership for Handwashing with Soap, which began in 2001. The partnership joins multiple corporate and international development agencies including the United Nations Children's Fund (UNICEF). Its Asian roots are in the government of the state of Kerala, in India, and the project now includes an initiative in Nepal. [41]

It may appear that Government has a limited role in encouraging social entrepreneurs. As noted by the Mr. Edward Miliband, Secretary of State for Energy and Climate Change, Government of the United Kingdom, "Government does not create the inspiration for social enterprise, but it can help or hinder what they do". However, a 2007 study of State-sponsored social enterprises in the United Kingdom found that, after initial difficulties involving "turf" and rigid Government ideas about what needed to be done, two thirds of these enterprises had developed innovations and were financially sustainable after only two years.

Public policy support for social entrepreneurship ventures can include favourable regulatory and tax

systems (especially non-profit taxation and donation rules), and a proactive attitude towards the development and execution of public private partnerships, including partnerships that may replace existing Government services.

Social entrepreneurship support strategies are centred on the fundamentals of the "ecosystem for wealth creation" articulated by social entrepreneur expert Mr. C.K. Prahalad as follows:

- A market-oriented ecosystem that adapts and evolves and can be resilient and flexible
- Education across all levels to foster responsible entrepreneurship
- Reduction in the inequities in contracts due to asymmetries in (a) access to information, (b) choice of partners, (c) ability to enforce contracts, and (d) social standing
- Building governance capabilities among the poor, in particular self-help groups such as those fostered by Grameen Bank and similar microlending organizations

He notes that public policies for social entrepreneurship remained a fertile area for study and experimentation: "There have been few attempts to focus on the symbiotic nature of the relationships between various private sector and social institutional players that can lead to a rapid development of markets at the Bottom of the Pyramid".[42]

Sustainable business competitiveness actions and examples

What are the specific goals of a "sustainable" business? The remainder of this chapter outlines a holistic path to competitiveness based on sustainability. It therefore suggests areas of strategic policy support that can be provided by forward-thinking Governments to support corporate action in the following areas: (a) resource productivity; (b) human productivity and culture; and (c) corporate responsibility. This is outlined in box 5.

Box 5 : Whole-system approaches enhance sustainable competitiveness

The greater competitiveness of a more sustainable business results from the strong execution of practices which include:

☐ **Resource productivity (i.e. efficiency)**

- Energy and productivity
  - Energy productivity
  - Use of sustainable energy sources
- Water and other natural capital productivity
  - Water productivity and quality
  - Sustainable agriculture / silviculture
- Materials productivity
  - Zero waste
- Biomimicry-based design (including dematerialization)
  - Elimination of toxics
- Eco-industrial development and circular economy

☐ **Human productivity and culture**

- Human health and safety (individual and family)
- Sustainable production and consumption training/education
- Equitable performance incentives (including enterprise ownership)

☐ **Corporate responsibility**

- Transparency and ethics
- Sustainability-related capitalization
- Community respect and support
  - Restorative management (long-term building of natural and human capital)
  - Micro-enterprise or disadvantaged business support
- Enterprise-wide and Life-cycle (value-chain) management
  - Sustainable/Environmental management standards/systems
  - Life-cycle Management

Resource productivity

Resource productivity (that is, eco-efficiency) is the most fundamental of competitive advantages: if the production processes use fewer materials and less energy and water, they have a built-in marketplace advantage (lower cost) especially in today's context of rising energy and commodity prices. Resource productivity strategies used in or suggested for the Asian and Pacific region include:

Energy productivity. Such productivity should be supported by Government regulatory requirements (through market-based instruments for building energy certification and electrical-product labelling schemes.[44]

The greater use of *sustainable energy sources.* This should be fostered through increased support from Governments for sustainable energy building and transportation system designs. Specifically, this should include Government support for distributed energy and independent power production, and sustainable building designs.[45]

Nepal provides a good example with its subsidy package for renewable energy sources, which was developed in 2006, and includes (a) business tax exemptions, (b) subsidies for microhydro development, especially when part of integrated watershed management programmes, (c) subsidies for the home installation of PV electrical systems and efficient cooking stoves, and (d) support for biogas projects (capturing energy from decomposing organic matter).[46]

Natural capital management. Governments must consider the importance of cost/benefit discount rates that tend to undervalue future assets (for example, standing forests). Even negative discount rates should be considered out of respect for future generations.[47]

Sustainable agriculture/silviculture. This can be supported by rewarding, via fiscal policy, procurement processes that use the ISO 26000 social responsibility guidelines regarding social contracts, especially in rural areas. Support can also be provided to develop sustainable agriculture cooperatives, such as the organic market and green consumer movement supported by the Thai Health Promotion Fund,[48] and other community-supported agriculture ventures.[49] Like all business development strategies, whole-system approaches that assist small sustainable farms need support, including through Government or social entrepreneurial initiatives for consumer education, pricing policies and marketing support, and relevant certification systems.[50]

Enhanced materials productivity. Such productivity usually begins with the development of zero waste strategies. The implementation of such strategies can be supported by fiscal policy in order to facilitate investments in developing material-use efficiency and recycling systems, and by institutions in order to provide businesses and consumers with training/education. The reward, on the business side, is a reduction in the costs of raw materials for manufacturing and waste disposal.[51]

Eco-industrial development and circular economy systems. These encourage the use of waste from one industrial operation as raw material for another. Siting complementary industries in close proximity can produce significant cost reductions for all system participants. However, such eco-industrial parks are difficult to establish and therefore deserve particular public policy attention.[52]

Biomimicry-based design and production (including dematerialization and the elimination of toxics). This leading-edge practice can be facilitated by linking biological and chemical scientists with company engineers through systems such as that developed by the Biomimicry Guild.[53] In addition, increased biomimicry research at universities or Government research institutes can help a nation's businesses gain a technological advantage.

Human productivity and culture

A sustainable company acquires human productivity and cultural advantages because the company's core values do not differ from those of its employees for sustainable economic prosperity. In other words, nobody wishes to leave the next generation worse off than the present one, and people will be more motivated to work for organizations that support this view.

For example, in 1998, as part of its rebranding as "beyond petroleum", BP (British Petroleum) announced a corporate commitment to reduce by 2010 its emissions to 10 per cent below its 1990 levels. BP achieved the goal in only four years with an investment of US$20 million, and in the process saved itself US$650 million over the following decade (net present value). However, BP executive Mr. Rodney Chase reflected that, even if the programme had cost BP money, it would have been worth implementing because the leadership on climate change made it the kind of company that the best talent wanted to work for.[54]

The 2007 Tandberg survey (of more than16,000 people in 15 countries) found that, globally, 80 per cent of workers would prefer to work for companies with a "good reputation for environmental responsibility", with Australia and China in the top 4 countries at more than 84 per cent.[55]

Human productivity strategies used in or suggested for the Asian and Pacific region include:

Worker family support, and individual and family health and safety. These strategies include family care leave, wellness support, and affordable and healthy housing support. They also include workplace safety; such as zero injury and/or accident strategies that have been embraced by leading sustainability performance companies such as Vedior N.V.[56] and DuPont.[57]

Government policy to reward enterprises for training/education programmes for workers and their families. These programmes can reduce Government costs for adult education while simultaneously developing a more skilled workforce that is able to serve diverse industries as well as current employers. For example, in the Republic of Korea, Yuhan-Kimberly has increased its support for lifelong learning for employees from 54 to over 300 hours per year since 1998. Its in-house "learning cafeteria" of courses for knowledge workers is made up of 60 per cent technical and vocational training and 40 per cent social and leadership training.[58] Governments can also ensure adequate support for distance learning opportunities for citizens, such as the College of Internet Distance Education of Assumption University in Thailand.

Sustainable production and consumption training/education. This supports sustainable economic development and a competitive advantage (see also the chapter on sustainable consumption). Government support for non-profit sustainable-consumption education organizations such as the ISO Committee on Consumer Policy, which is a Geneva-based international organization with activities in 99 counties, can promote consumption that supports companies that contribute more to community social and environmental progress.[59]

Equitable performance incentives. Productivity suffers when workers are challenged by the unaffordability of the four basics (housing, education, mobility and health care).[60] In areas where home ownership is not affordable for workers, companies have devised innovative matching programmes that support mortgage down payments.[61]

Other important incentives for the more equitable treatment of workers include policy or taxation support for (a) employee ownership, (b) avoiding excessively high or excessively low compensation, (c) financial rewards for outstanding design through long-term royalties to designers (for example, building designers) whose designs exceed current standards and (d) service leases by businesses such that taxation is less when the manufacturer maintains ownership throughout the product's life cycle. This "service-leasing" strategy (also known as the solutions economy) stimulates sustainability performance because the manufacturer must pay for the operational and disposal costs of their products, which is a strong incentive for greener design.[62]

Corporate responsibility

"Corporate responsibility" has evolved to encompass accountability for the sustainability performance of company. Governments have an interest in promoting corporate responsibility because it is key to sustained competitiveness in a globalizing economy.

Corporate responsibility strategies used in or suggested for the Asian and Pacific region include:

Transparency of business policies and ethics in business. Full information for consumers is a basic economic tenet of successful markets. Ways to put this into practice include the public posting of employee/owner compensation, sustainability performance reporting and requiring privately held enterprises to publicly report their results in the same detail as publicly owned firms.[63]

Sustainability-based capitalization. Financial requirements of businesses by investors and lenders often influence the adoption of a short-term focus, rather than long-term strategic investment in sustainability-based competitiveness. Governments, particularly ministries of finance, need to examine lending and investment regulatory schemes to ensure that long-term investment strategies are rewarded in the marketplace. Specific policies that reward green business concepts and strategies can be developed through partnerships. An example is the work of the Association of Development Financing Institutions in Asia and the Pacific, which engages national financial regulatory bodies for the development of "green financial products" that support the creation and growth of sustainable (green) businesses.[64]

Community respect and support

Restorative management (the long-term building of natural and human capital). This is the ultimate goal of sophisticated private sector management for sustainability. Corporate and government strategies that help to restore natural capital can help to enhance livelihoods and earn the respect and support of local communities.

For example, land conservation programmes such as the Green Village Credit Programme of the Nature Conservancy in China, can succeed with pro-poor policy support for conservation set-asides, especially in ecologically special areas. Direct incentives (such as through payments for ecosystem services) can also succeed at the site level.[65]

Micro-enterprise or disadvantaged business support that is, social entrepreneurship. Community support can also be achieved through a focus on this, as described in a previous section of this chapter. Governments can financially and politically support micro-enterprise lending institutions, such as Grameen Bank's micro lending systems, and the Bank's more recent ventures, such as the Grameen Shakti programme that make sustainable energy systems available to the rural poor through enterprise development (see box 4). Governments can also seek to reduce the barriers to renewable energy, including high up-front costs, very limited consumer financing and the lack of support from traditional financial institutions (partly due to perceived rather than actual risk).[66]

Enterprise-wide and life-cycle (value-chain) management

Sustainable/environmental management standards and systems need continued refinement through Government collaboration with the private sector. The Government of Bangladesh, for example, supports the inclusion of environmental management system (ISO 14001) training in key business and rural development training curricula, and emphasizes the importance of producing "environmentally friendly products" to export sectors. At the same time, the Government's environmental regulatory system has been improved to better support progress towards a "pollution-free environment".[67]

The use of sustainability management systems can be enhanced by Governments adopting them and demonstrating their effectiveness at reducing operating costs as well as stimulating sustainable design. Of particular importance is the Government adoption of life-cycle sustainable procurement policies, which sends a clear market signal to the private sector regarding the need to produce sustainable products and services as mainstream products that are widely available and demonstrate superior costs-of-ownership.[68]

Government economic development strategies can include "industrial cluster-based" approaches, with a "cluster" being defined as the life-cycle production system for a product. These can foster important synergies, as shown by the Maniwa (Japan) Wood Industry Cluster eco-transformation network approach, which reduced CO_2 emissions by 58,000 tons per year while reducing waste and improving company knowledge about sustainable practices.[69]

Government policies can better support companies' taking full life-cycle responsibility (or extended producer responsibility) for their products, such as was done in 2006 by Clif Bar & Company in California, using the natural capitalism life cycle management model.[70] Life-cycle management tools are rapidly improving and their practitioners are collaborating to ensure greater cost-effectiveness for companies through projects such as the initiative between UNEP and the Society of Environment Toxicology and Chemistry (the UNEP/SETAC Initiative).[71]

In conclusion

As sustainably managed companies continue to outperform their rivals, the prophecy in the early 1990s of former DuPont CEO, Mr. Edgar Woolard, is becoming true: unsustainable companies won't be a problem in the future because they won't be competitive enough to survive.

Governments in the Asian and Pacific region will benefit from a whole-system approach to business development policies that examines all the policies, rules and incentives that influence business behaviour those that detract from sustainable management, can be changed so that the entire Government approach reinforces sustainable enterprise management.

Sustainability strategies that follow "green growth" principles are a recipe for healthy businesses today and they will maximize the potential for future healthy businesses to serve future generations from adequate national stocks of natural and social capital.

Sustainable Consumption[72]

"… we (developing nations) are imitating the world which created pollution. So our lifestyle is imitating the lifestyle of the people who have already led the way. That is the most dangerous part of it … So, we have to find lifestyle which is consistent with our principle or decision -- we should leave the world safer than we found it."

Muhammad Yunus, Nobel Peace Prize winner, 2006

Several Asian and Pacific countries have made stunning progress in reducing poverty and enhancing the quality of life for millions of their citizens. Seeking to reduce the environmental impact of economic growth in such countries would be the cancelling a party that had been years in the planning. However, as prices of natural resources and commodities rise, as climate change deepens and accelerates, and as mountains of waste overflow landfills and stretch municipal budgets, sustainable consumption is emerging as a necessary condition for continued economic growth, even in developing countries.

This region, with the lowest per capita access to natural resources, cannot afford to use its natural and other resources wastefully. But as incomes in the region grow, consumption patterns become less and less eco-efficient. Sustainable consumption strategies make it possible to achieve eco-efficient economic growth while people rediscover, reinstate and revitalize rich Asian and Pacific cultural values and traditions.

Improving the quality of consumtion

Sustainable consumption is often viewed as a Western or Northern concept. In reality, sustainable consumption is embedded in Asian and Pacific cultural values and traditions, which are still in evidence today despite rapidly changing economies and societies. Strong symbols of sustainability remain important to Asian and Pacific citizens and institutions: the nourishment of rice paddies, the everlasting power of rivers and watersheds, and the importance of family and self-sufficiency. These symbols epitomize the enduring values of quality over quantity, natural over artificial, organic over chemical and durability over obsolescence. [73]

Demand-side management approaches seek to change the quality of consumption, rather than reduce consumption through sustainable infrastructure development and ETR. In 2007, two separate polls found that Chinese consumers are more willing than people in other countries to support climate change taxes (85 per cent in favour) and buy products from environmentally responsible companies (67 per cent). In the Philippines, Indonesia and the Republic of Korea, more than two thirds support climate change taxes (if used to finance climate change solutions), a higher percentage than for nearly every other of the 21 nations surveyed.[74]

Table 3 : Consumer attitudes towards sustainable consumption

	It is necessary to increase energy costs (%)	Implement CO_2 taxes if used for alternative energy sources (%)	More likely to purchase from businesses with a good environmental reputation (%)	Average "green indicator" response (%)
Australia	81	87	52	65
China	83	97	67	68
India	49	60	-	-
Indonesia	83	79	-	-
Philippines	48	69	-	-
Republic of Korea	49	70	-	-
Canada	72	80	34	59
United Kingdom	76	76	27	49
USA	65	74	42	55

Source: TANDBERG and Ipsos MORI, "corporate environmental behaviour and the impact on brand values", 2007, accessed at <www.ivci.com/pdf/corporate-environmental-behaviour-and-the-impact-on-brand-values.pdf> in November 2007 Consumer attitudes towards sustainable consumption and the BBC Worldservice poll on climate change actions, conducted May-July 2007, accessed at <http://news.bbc.co.uk/1/shared/bsp/ hi/pdfs/02_11_07bbcclimatesurvey.pdf>, in December 2007.

This points to the unrecognized market, and therefore untapped economic potential for sustainably produced and delivered goods and services, even in developing Asia and the Pacific. This potential is evident not only in regional markets; there is a rising demand for organically produced and nature-inspired goods and services in the West, some with a basis in Asian traditional practices, such as organically and sustainably cultivated cotton clothes from India and herbal medicines and massages from Thailand.

Such international appreciation for Asian and Pacific traditions can eventually drive the rediscovery, and search for a better understanding, of Asian and Pacific spiritual and cultural wealth within Asian and Pacific countries. This search is also facilitated by a growing unease among consumers, even in Asia and the Pacific, about the environmental impact of their lifestyles and the limited possibilities for change. The view that consumption, particularly conspicuous consumption, has a dominant role in improving human well-being is also being questioned.

A sustainable future is also more achievable in such a context; the substantial economic potential represented by these markets can be realized by strengthening environmentally beneficial cultural values and traditions, and "mainstreaming" them within the economy. This is similar to the "sufficiency economy" principles in Thailand, which set the cultural tone that sustainability is not only the preferred future, it is the only viable future.

Why is sustainable consumption not only potentially profitable but also urgent needed? While a large proportion of the region's population still does not have access to the basic needs of food, energy, water and infrastructure, declining poverty rates are giving birth to a rising consumer class. While sustaining the growth of economies across Asia and the Pacific, it is already exerting high levels of environmental pressure, evident in the form of unmanageable levels of waste and pollution, and increasing energy and water demand exceeding existing resources. In Pakistan, the contribution of domestic demand to GDP more than doubled between 2006 and 2007, with substantial increases also in Indonesia, the Philippines and Singapore.[75] The health and other environmental impacts are unfairly borne by those who can least afford it – the poor. At the same time, climate change provides indisputable evidence that global environmental systems are reaching a tipping point. Consumption levels, even those that are only now dreamed of in developing countries, need to be urgently addressed.

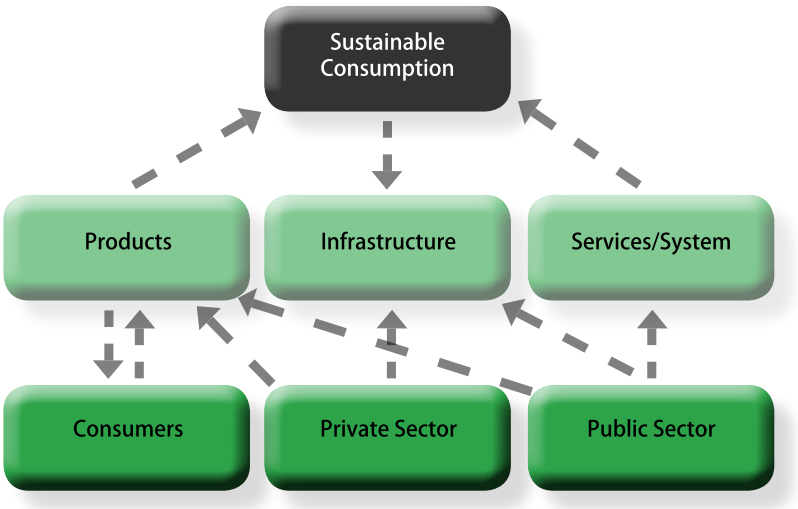
Today, with 3.9 billion people or two thirds of the global population, 1.5 times the global population density, and the most limited access to natural resources per capita, the Asian and Pacific region, needs more than ever to revive cultural values and traditions fostering efficient, cleaner and more thoughtful use of scarce natural wealth for the well-being of all.

Sustainable consumption and the role of various actors

Production and consumption patterns are the basic drivers of any economy and play an important role in shaping the sustainability of economic growth. With increased industrialization, conditions and incentives for cleaner, more environmentally sustainable production processes are provided by both evolving regulatory frameworks and increased prices of raw materials, (energy and water), and are driven by the demand for a better quality of life.

However, there are no similar price signals within the economy that will move society towards achieving sustainable consumption; Governments must actively promote this. It requires a whole-system approach in addressing consumption patterns, involving all three major actors of an economy: Government, consumers and producers.

Figure 7 : Sustainable consumption: stakeholders



Government policy: The ESCAP Second Green Growth Policy Dialogue, held in Beijing in May 2006, underlined the important role that public policy plays. Presentations and discussions at the forum pointedout that Governments' roles should include:

- Developing policy frameworks for regulatory standards; infrastructure development and demand-side consumption management
- Demand-side management using appropriate economic instruments and pricing systems
- Nurturing stakeholder engagement – both consumers and businesses
- Promoting the sustainable consumption of products and services, via public procurement processes and infrastructure development
- Re-enforcing the linkages between traditional lifestyles, cultural values and consumption patterns
- Supporting energy efficiency progress with policies and standards.

An underlying principle is the need to reduce the ecological impact of consumer patterns, rather than reduce the well-being that consumption is intended to produce; in other words, to improve the quality of consumption, rather than reduce the quantity of consumption. Making the "business case" for a sustainable consumption ethic is a great challenge and requires courageous political and cultural leaders. Compelling arguments for sustainable consumption must appeal to both the humanity and the collective desire to remain globally competitive on all fronts, including in securing natural capital as inputs to the economy. Farsighted leaders will recognize the innate competitive advantages presented by cultural values and traditional resource management practices, and engage them for building greener, more competitive economies.

Role of consumers: Consumers, a group that includes individuals and organizations (whoever the consumer of a product or service is), are the originators of economic activity. Successful companies will quickly and effectively respond to changes in consumer demand. Thus, a sustainability-oriented and well-informed consumer is the driver of progress towards a sustainable economy.

Few financial incentives currently exist for consumers to adopt sustainable consumption patterns. This is partly because so many of the environmental and social costs involved in making products and services are not included in the price. As "externalities", they make the wider public pay for the perceived improvements in the welfare of a small minority, and distort consumer choices because the market prices do not reflect the sustainability performance of the product (that is, if there were no externalities, sustainable products would consistently be the least expensive).

Instead, consumer demands are shaped by artificially low prices for unsustainable products or services, widely publicized unsustainable consumption habits and the lack of information about (a) the quality of products (b) the resources used for their production, and (c) their end-of-life disposal.

As a result of these market distortions, developed countries are now faced with massive waste management costs which are driving policy innovations such as extended producer responsibility,[76] sustainable product service systems and waste and pollution pricing. Investments in these significant policy and technology approaches are needed to reverse entrenched consumption patterns.

Consumption is driven strongly by symbols. Material goods that lead to the unsustainably high consumption of energy and resources, such as large cars, remain an important symbol of achievement and status to those who have left poverty behind – in all countries, be these developed or developing.

Consumer education and public disclosure systems allow consumer to act independently of the pressures exerted by a globalizing advertising industry and peers. Information about the quality of products and services, resource use and intensity, and life after use, or product and service life cycles, are the necessary prerequisites to allow consumers to make conscientious choices towards sustainable consumption.

While knowledge and information can help the individual to resist rising consumerism and to embrace the philosophy behind the growing global movement of "green" consumers, a basic condition is the availability of sustainable choices. This requires policies, such as demand-side management, that reward producers providing sustainable choices.

Businesses (producers): The section on the greening of business (page 39) shows how the private sector can support the transition to greener growth. A global paradigm shift is guiding business and investment, based on the profits that sustainability strategies can generate. Around the world, rising consciousness and political will for developing a more "sustainable" global economy is evidenced by the more than US$100 billion in annual capital flows generated by pioneering entrepreneurs, organizations, and Governments in renewable and alternative energy production to reduce CO_2 emissions.

Some of the most powerful players in today's economy, including Citigroup Inc, The Goldman Sachs Group, Inc., Kleiner Perkins Caufield & Byers; McKinsey & Company; Marks and Spencer, and Wal-Mart Stores, Inc.; many of which have important economic activities in the Asian and Pacific region, have announced breakthrough environmental initiatives in the past two years. Through the supply chain, these innovations will play an important role in formulating a new sustainable business culture in the Asian and Pacific region as well.

Businesses have shown they can move quickly towards offering more sustainable products and services when the demand for them is clearly evident. Incentives for innovation in sustainable products may help, but the primary stimulus that businesses need is a commitment towards sustainable consumption by Governments (especially Governments' own procurement of goods and services).

To support all three actors in the region in May 2006, ESCAP established the Regional Help Desk on Sustainable Consumption and Production in Asia and the Pacific in partnership with the China Standard Certification Center and UNEP. This is just one step towards assisting Governments to forge strong partnerships with NGOs and sustainability-aware businesses in order to dispel the illusion that carbon and materially-intensive economies and life styles will lead to higher levels of well-being. The following are leading examples that show the way forward and demonstrate that such an approach is attainable:

- The Chinese resource-saving society concept has been introduced into the eleventh five-year plan.
- The 3R (reduce, reuse and recycle) concept, which aims to achieve the integration of the environment and the economy through the effective use of resources, is being actively supported by various ministries in Japan.
- The Thai sufficiency economy, as exemplified in the numerous Royal Projects in Thailand, is a good example of reviving local knowledge in order to achieve a decoupling between the economy and the environment while building the self-reliance and resilience of local communities in difficult times.
- The concept of "gross national happiness" is the basis of the development strategy of the Royal Government of Bhutan. Based on Buddhist philosophy, it provides for preserving social welfare, strengthening the Bhutanese culture, preserving national resources and increasing the national pride of the Bhutanese people.

Focus areas for a consumption policy that are most relevant to Asian and Pacific countries

A review of the Asian and Pacific development context and environmental sustainability challenges suggests that the priority areas for action are: (a) promoting eco-efficiency in resource use; (b) sustainable "green" procurement in the public sector; (c) food consumption patterns and (d) greening urban transport and buildings.

Increasing eco-efficient resource use

Energy and water are two of the most important regional inputs for economic activities, characterized by increasing scarcity, as well as by inefficient and wasteful practices.

As the Asian and Pacific region becomes the world's production centre, rapid industrialization and urbanization in many of the developing countries leave their mark with unresolved resource-use challenges and unsustainable consumption patterns. Considering the critical need for global carbon emissions to be reduced by 80 per cent by 2050, carbon taxes and the internalization of costs in energy and water pricing systems are now a leading way to send the right signals to the energy marketplace for: (a) fuel shifting, (b) increased energy and water efficiency and productivity, (c) increased innovations in renewable energy production and (d) greater local self-reliance.

Under-pricing energy creates unfair advantages for non-local products and businesses. Appropriate pricing and fuel tax systems can generate valuable financial reserves to support national development schemes to fund underdeveloped alternative and renewable energy production processes.

Progress also requires that the economic incentives governing consumer choices support rather than diminish sustainability performance, such as through life-cycle assessment. The heavy investment by several governments in the production of biofuels preceded a recent analysis that shows that when the entire life cycle is taken into account, biofuels are more harmful to the climate than fossil fuels. There are important implications for soil and groundwater, and food security, particularly in the Asian and Pacific context, where land is an increasingly scarce resource.

Considering the forecast for increasing domestic water use in developing countries in Asia and the Pacific, there need to be more examples of economic policy coupled with robust sustainable-consumption awareness campaigns in the region. One successful example is Singapore's national water conservation strategy which was introduced in 1991. It is based upon a progressive a water pricing scheme, which includes a water tariff and a water conservation tax. Water is a very precious and scarce natural resource in Singapore because the country has very little available water and has been importing from Malaysia since its independence. Revenues have been used to invest in an innovation called NEWater, which is the brand name given to reclaimed water produced by Singapore's public utilities. More specifically, it is treated wastewater (sewage) that has been purified using dual-membrane (via microfiltration and reverse osmosis) and ultraviolet technologies, in addition to conventional water treatment processes.

Sustainable procurement in the public sector

In many countries, governmental procurement represents as much as 20 to 25 per cent of GDP, and Governments can therefore favourably push for a change towards sustainability in both producing and consuming sectors. Particularly in smaller countries, the Government is the most important consumer, and the public sector is therefore in a position to negotiate not only a good price and good quality, but Governments can push companies to adopt sustainable production methods, life-cycle approaches and sustainability strategies for their entire production cycle.

Government procurement policies and regulations that set procurement standards based on sustainability criteria are a basic requirement for boosting sustainable production. They also set an example for private consumers and companies, and demonstrate Government commitment to environmental protection.

Initially, the procurement of green products may be more costly than that of regular products. However, in the long run, green procurement will save more of the public budget because its production causes less pollution and less environmental, degradation which would burden the economy at a later stage.

For instance, in the Asian and Pacific region:

- Thailand has included green public procurement in its tenth national economic and social devel opment Plan (2007-2011),
- In 2004, the Republic of Korea passed the Act on the Promotion of the Purchase of Environment - friendly Products,
  In 2000, Japan has implemented a law on promoting of procurement of eco-friendly products.

Green public procurement leads to the greening of private procurement through the supply chain. The International Green Purchasing Network collects and disseminates information about enterprises that have implemented green procurement and sustainable production methods in Asia and the Pacific. This information is available to Governments to help with the identification of possible suppliers for green public procurement schemes.[82]

Food

Changing food consumption patterns are a basic driver of environmental change in Asia and the Pacific, more than in any other global region. Spending on food makes up the highest proportion of household expenditure, representing some 50 per cent in Indonesia, for example.[83] The production of the region's food also takes place on a limited natural resource base; changing consumption patterns have had profound impacts on agriculture and rural development, land resources and the demand for water.[84]

Regional preparations for the sixteenth session of the Commission on Sustainable Development noted that "Global and national food systems are increasingly driven by consumer interests, changing consumption patterns and food quality and safety concerns. Food processing and retailing industries are pro foundly affecting production, markets, trade, diets and public policy. Where developing countries fail to harness these different forces for public benefit and thereby realize the benefits of globalization, poverty and food insecurity increases".[85] Changing waste streams also show higher proportions of food packaging, rather than the organic waste that used to characterize regional food waste.

An important aspect of the unsustainability of the globalizing economy is the distance travelled by products, especially products used only once, such as food, packaging and combustion-based energy sources. The production of crops with a high water content for export (for example, citrus fruit) results in losses of "virtual water", which is water embodied in production processes. Although Thailand is identified as a water-stressed country, based on its demand for water relative to the available supply, it is ranked as the fourth largest net exporter of virtual water, with other water-scarce countries not far behind.[86]

Important policy synergies can be achieved by fostering consumption patterns so that meeting food security needs, reducing undernutrition and hidden hunger, reducing environmental pressures, and supporting the development of a vibrant and inclusive rural sector are all aligned.[87]

Valuing and supporting local production is an important policy approach. Economic studies are emerging that clearly document the advantages of more local purchasing. A New Zealand study estimated that each US$1 million worth of imported products can result in 16 job losses and US$540,000 in negative economic effects, such as reduced local spending power and tax revenue, and increased welfare payments. People also prefer local brands; a 2007 poll of people in "emerging markets" found that 60 per cent would buy a local brand over an international brand (in most cases) if prices were equal.[88,89]

Governments can support the greater availability of local products, and local enterprises to provide them, through cooperative sustainable procurement systems. The following are examples in the United States of America: local food purchase policies Woodbury County, Iowa; Memphis City Schools, Tennessee School District; and the City of Albuquerque, New Mexico.[90] In Thailand, the Population and Community Development Association focuses on local sources for its successful school lunch programme. The Royal Development and Chitralada Projects have a similar approach in setting up small businesses in support of local community poverty reduction efforts, which were initiated to support the "sufficiency economy" concept.[91] The value chain model as described in figure 8, illustrates such concepts.

The section on sustainable infrastructure (page 28) addresses this green growth approach, as the most important determinant of current and future consumption patterns. This assumes more importance in Asian and Pacific countries, because of the large unmet infrastructure need, and the equally large infrastructure development to take place in the near future.

Greening of urban transport and buildings: shift in consumption patterns

Urban areas are responsible for 75 per cent of the all GHG emissions in the world. Almost 50 per cent of the world's urban population (about 1.5 billion people) live in Asian cities, of which 11 are mega-cities. Projections forecast that the urban population will grow by another 1.5 billion people by 2030, with a 165 per cent increase in domestic energy demand. Passenger vehicle ownership per capita in urban areas is higher than the national vehicle ownership per capita in most countries in the region. There is a progressive increase in GHG of emissions from urban areas.

Figure 8 : The value chain model: from cow to consumer

While consumers drive the market, in the short-term, individuals and, to a large extent, organizations, choose the most convenient and affordable products and services offered. Convenience and affordability are determined by the availability of the infrastructure and supportive Government policy. The transportation system is an excellent example of consumption choices being driven by Government and its urban infrastructure planning and road management. The following are some leading, though insufficient, examples of GHG emission reduction policies and measures in the region:

- Mass transit system in Tokyo and in Singapore
- Transport demand-side management policies in Singapore
- Biofuels in Thailand
- Electric vehicles, solar water heater and cleaner brick kilns in Kathmandu
- Differential vehicle tax rates in Bangkok

Transport demand management policies that employ economic instruments, such as carbon taxes and fees for road users in city centres, can shift passenger travel demand served by low occupancy vehicles to public mass transit services; quality of life and productivity; and drastically reduce carbon emissions and time wasted.

Though fully electric vehicles or plug-in hybrid vehicles (designed to accomplish most urban driving with electricity from batteries only) do not need a special electrical power charging infrastructure, the prospect of CNG or hydrogen-powered vehicles illustrates the "chicken or the egg: which comes first?" dilemma that often challenges major shifts in sustainable consumption patterns.

CNG is one of the least costly, and lowest carbon fuels available today, but can be used only where infrastructure for its storage and delivery enables its use. Public transportation (for example, buses and taxis) has been leading the conversion to CNG power in Asia. As part of its commitment to reducing transportation climate change impacts the local government in Bangkok has established pricing and production incentives to encourage the use of CNG systems, including those that use biogas produced from organic waste. Beginning in 2008, NGV system-based public buses are to be widely used on the roads of the mega-city. A similar CNG conversion programme in the Philippines is expected to result in 300,000 CNG vehicles in use by 2015.[94,95]

Similarly, for other sources of energy, such as hydrogen, biofuels and electricity to be used for vehicles, Government support is required in order to build markets that will make the provision of the infrastructure economically feasible.

The potential reduce GHG emissions from buildings is also considerable, but the energy efficiency of building has, until recently, been a neglected area. The Clinton Climate Initiative established the C40 Large Cities Climate Leadership Group, which will focus on retrofitting old buildings in 11 Asian cities. Working in the region the Initiative will focus on providing city management authorities with energy-efficient equipment, building materials and systems, lighting products and waste-to-energy systems, as well as water saving and management technical assistance. This work will create an opportunity to set up a process for greening the building sector in the region.[96]

The future of the building sector in the region is in promoting of green building codes for design, construction and operation. A green approach to the built environment involves a holistic approach to the design of buildings. All the resources that go into a building, be these materials, fuels or the contribution of the users, need to be considered if sustainable architecture is to be produced. The design of "green" building places a high priority on health, environmental and resource conservation performance over its life cycle. The new priorities expand and complement classical building design concerns of economy, utility, durability and delight. Most green buildings are of a high quality; they last longer, cost less to operate and maintain, and provide greater occupant satisfaction than standard developments. What is surprising is that good green buildings often cost little or no more to build than conventional buildings.[97]

Holistic approach to enhancing the sustainability of consumption: " whole system keys"

Based on discussions by global experts and decision makers in the Asian and the Pacific region (debating sustainable consumption strategies at the three ESCAP Green Growth forums), as well as and the above discussion, box 6 identifies important components of a whole-system approach to sustainable consumption progress.[98]

UNEP has published an excellent step-by-step guide to developing sustainable consumption programmes.[99] The whole-system approach outlined above and the ideas in the present publication provide wider scope to stimulate sustainable consumption, complementing the UNEP recommendations.

In conclusion

Today, people in the Asian and Pacific region are looking for ways to revive and reinstate traditional cultural values that promote the sustainable, eco-efficient use of natural resources, and so build business competitiveness. Sustainable consumption is supported when traditional values, such as doing more with less, are embraced, and supported by public policy. The revival and strengthening of such values have been described as actions underpinning societal change, and are often seem as complementary to ideals related to social justice and harmony. Ms. Vandana Shiva, an Indian scientist and sustainability activist, for example, calls for a new model of "Earth democracy", which is grounded on living economies and "compassion, justice and sustainability". [99]

Emerging from NGOs, business and governments are other leaders that have the courage and will to lead their countries into adopting a more sustainable development pattern. Globalization is beginning to play a conducive role in spreading such moderation and simplicity in lifestyles that can contribute to enhancing the environmental and social sustainability of the region. Sustainable consumption strategies now have greater momentum and potential for success than ever.

Box 6 : Whole-system approach to sustainable consumption

Measurements

- Social welfare versus gross national product
- Measuring natural capital and carrying capacity

Life-cycle approaches

- Life-cycle management of consumption and production
- Consumer friendly information on life-cycle impacts
- Resources to support life-cycle analysis and management

Symbols

- Sustainability is elegance (less is more)
- Fending off unsustainable cultural models

Practicalities

- Easy access
- Valuing and supporting local products and enterprises
- Marketing: creating attractive educational conversations
- Distributed essentials generation

Leadership for sustainable capitalism

- Sustainability and capitalism are not contradictions
- Governments: model authenticity and long-term thinking
- Make it everyone's responsibility
- Organization life-cycle management resources

Endnotes

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63. Ibid.

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69. V. Anbumozhi, Institute for Global Environmental Strategies, "Greening the Industrial Clusters: a Business Imperative from Japan", presentation at the ESCAP Third Green Growth Policy Dialogue: the Greening of Business and the Environment as a Business Opportunity, Bangkok, 5 to 7 June 2007.

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71. See the Initiative's website at <http://lcinitiative.unep.fr/>, accessed in December 2007. For proceedings of the 2007 3rd International Conference on Life cycle Management, see <http://www.lcm2007.org/>, accessed in December 2007.

72. The contribution of the main author of this chapter, Christopher Juniper, Vice President, Natural Capital Solutions (writing in collaboration with ESCAP staff), is gratefully acknowledged.

73. These values have been described as traditional values in Asia that are being neglected in favor of materialism, Dr. P. King, Prognosis for Sustainable Consumption and Production in Asia and the Pacific, Melbourne University working paper, (School of International Development, Melbourne University, 2005), <http://www.social-environmental.unimelb.edu.au/research/ workingpapers/pdf/ wp2-05.pdf> accessed in December 2007.

74. Source for 67% of Chinese preferring products from companies "with a good reputation for environmental responsibility", highest among all countries polled (lowest is 18%), is the Tandberg poll, "Corporate Environmental Behavior and the Impact on Brand Values", released October 2007. Source for poll figures on climate change taxes in China, The Philippines, Indonesia and the Republic of Korea is the BBC World Service poll on climate change actions, conducted May-July 2007, accessed at <http://news. bbc.co.uk/1/shared/bsp/ hi/pdfs/02_11_07bbcclimatesurvey.pdf>, in December 2007. The poll report notes that urban residents were polled in China. The vast majority of citizens polled in Asia (for example, 85% in Indonesia) believe energy prices on fuels most responsible for climate change must increase, and that individuals will need to adjust their lifestyles to reduce their climate change contributions.

75. ESCAP. Key Economic Developments and Prospects in the Asia-Pacific Region 2008 (United Nations publication, Sales No. E.07.11.F.28) Bangkok, United Nations.

76. Extended Producer Responsibility means responsibility by the manufacturer for the entire product life-cycle. It is embodied as a concept in the EU Waste Electrical and Electronic Equipment WEEE Directive, and various legislative approaches are under consideration in the US.

77. S-PSS - refers to a new idea for less-resource intensive and quality centered business that improves sustainability performance and invites businesses to shift focus from selling products to selling the utility; therefore it can fulfill the same client demands with less environmental and social impacts.

78. "Conclusions", Second Green Growth Policy Dialogue: the Role of Public Policy in Providing Sustainable Consumption Choices: Resource-saving Society and Green Growth, Beijing, 13 to 25 May 2006.

79. Worldwatch Institute, State of the World 2008: Innovations for a Sustainable Economy, (W.W. Norton, 2008) accessed from <http://www.insnet.org/ ins_headlines.rxml?id= 5845&photo=> in December 2007.

80. Marks & Spencer Plan A – a five year project aiming at greening their supply and production chain is picking up in the Asia and Pacific region. For more details on Plan A refer to the Chapter on the Greening of Business.

81. Worldwatch Institute, State of the World 2008: Innovations for a Sustainable Economy (W.W. Norton, 2008) accessed from <www.insnet.org/ins_headlines.rxml?id= 5845&photo=> in December 2007.

82. For more information and references see <http://www.scphelp.org>, accessed in December 2007. See also <http://www.undp.or.th/download/Green%20Indicators.pdf> for more information about green public procurement and the sustainability development application in general, and <www.igpn.org/guideline/governments. html#JPN> for an overview of laws and guidelines pertaining to green procurement.

83. Representative of the Government of Indonesia, "Changing consumption patterns in Indonesia". presentation at the ESCAP Second Green Growth Policy Dialogue: the Role of Public Policy in Providing Sustainable Consumption Choices: Resource-saving Society and Green Growth, Beijing 23 to 25 May 2006.

84. The growing regional livestock population is the result of the increased demand for meat and dairy products, and as a result, there is an increased demand for grain, land and water. Poultry production requires less than half the amount of water, per kilogram, of that required for beef production. In addition to its newly acquired status as the production centre of the world, Asia and the Pacific is becoming the breadbasket of the world.

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86. As noted by ESCAP in State of the Environment in Asia and the Pacific 2005: Economic Growth and Sustainability (United Nations publication, Sales No. E.06.11.F.30), based on Food and Agriculture Organization. Water Resources of the Near East Region: Review. Rome, Food and Agriculture Organization, 1997, and A.Y. Hoekstra, and P.Q. Hung, Virtual Water Trade: Quantification of Virtual Water Flows between Nations in Relation to International Crop Trade. Value of Water Research Report Series No. 11, September 2002 (Delft, the Netherlands, IHE Delft 2002.

87. Contemporary Asians are turning away from traditional diets; hidden hunger (an inadequate intake of essential vitamins and minerals, rather than inadequate calorific food intake) affects nearly 1.5 billion persons in Asia and the Pacific, far exceeding the number of poor. Obesity and diabetes are new and alarming health threats that were alien to most regional countries only a decade ago.

88. Green Party of Aotearoa New Zealand, "Selling out, buying in and getting a fair go", citing a study conducted by BERL economic consultants, accessed from <http://www.greens.org.nz/ campaigns/ buylocal/cic8.htm> in December 2007.

89. Synovate, Battle of the brands for emerging market hearts, March 2007, accessed from <http://www.synovate.com/knowledge/infact/issues/200703/>, in December 2007. A separate 2007 survey found that Hong Kong consumers preferred international brands for financial, pharmaceutical/ chemical and travel purchases; see <http://www.cuhk.edu.hk/cpr/pressrelease/071009e.htm>, accessed in December 2007.

90. See the local food preference policy of Woodbury County, Iowa at <http://www.woodbury-ia.com>; the Memphis Tennessee, local preference policy at <http://www.mcsk12.net/admin/purchasing/Local-Pref-Pur-Prog.pdf>; the Albuquerque, New Mexico Policy, and many others policies in the United States at the New Rules Project website of the Institute for Local Self-Reliance, <http://www.newrules.org>. All websites accessed in December 2007.

91. For more detailed information see <http://www.rdpb.go.th/rdpb/EN/BRANDSITE/ theproject_s05.aspx>, assessed in December 2007.

92. See also Ram M. Shrestha, Carbon emissions and mitigations: lessons from cross-city analyses in Asia, 6 December 2007, accessed from <http://regserver.unfccc.int/seors/file_storage/vw24k1qgs9lzxue.pdf> in December 2007.

93. Ibid.

94. The Greener Cars programme of the American Council for an Energy Efficient Economy rates NGVs as the greenest vehicles available considering their fuel efficiency and emissions; see <http://www.greenercars.org>.According to the European Natural Gas Vehicle Association, NGVs can reduce GHG emissions 20-25% over petrol-powered vehicles and, by 2016, by 16% over heavy diesel vehicles while emitting close to zero particulates; the vehicles also "reduce CO by approximately 70%, non-methane organic gas by 89% and nitrogen oxide by 87%", accessed from <http://engva.org/Content.aspx?PageID=65> in December 2007. According to Tom Rizo of the Energy Research and Development Center, Philippines HOC, emissions are similarly reduced and oil changes are required one third as often, accessed from <http://www.cleanairnet.org/caiasia/1412/articles36826_TomRizo.pdf> in December 2007. According to the Energy Information Administration of the Government of the United States, natural gas emits about 30 per cent less CO_2 emissions than oil for the same energy content delivered; accessed from <http://www.eia.doe.gov>, in December 2007.

95. See "Energy Ministry persuades taxis to use compressed natural gas instead of LPG" Thaindian News, 23 November 2007; see also the NGV network report predicting in 2004 that by 2009, the number of NGVs in Thailand would reach 145,000, most of which would be taxis, accessed from <www.ngvnetwork.com in December 2007. In 2004 in the Philippines, executive order 290 created the Natural Gas Vehicle Program for Public Transport, which resulted in October 2007 in the opening of a CNG filling station in partnership with Royal Dutch Shell. See the Government of the Philippines, "PMGA launches pilot CNG project, hospital in Laguna", 24 October 2007, accessed at the Government website <http://www.gov.ph/ news/?i=19139> in December 2007.

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