

Internalizing the environmental costs of production – policy instruments and priorities

Although not captured in the GDP measure, environmental degradation, carbon emissions and air pollution reduce social welfare and undermine the sustainability of economies.

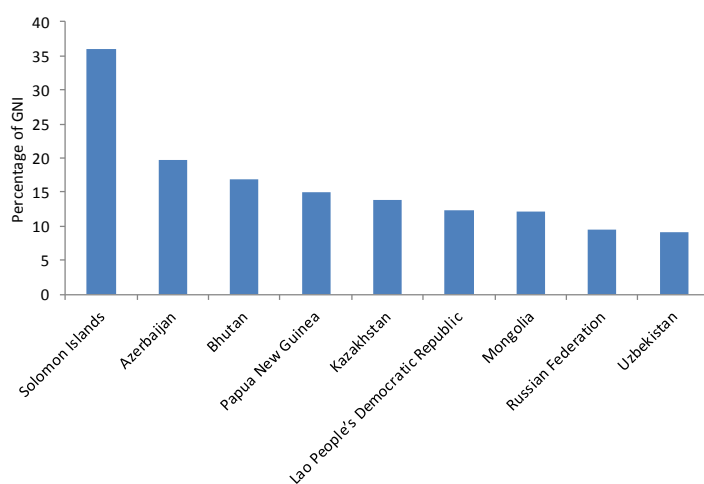
Over the past few decades, the Asia-Pacific region has experienced phenomenal real economic growth averaging 7 per cent over the period from 2000 to 2015, but this has been achieved in part at the cost of environmental degradation, concomitant health impacts and the intensive and unsustainable use of countries' natural resource wealth.¹ The region is highly vulnerable to climate change, the adverse effects of which can substantially undermine the economic development gains in the region and could force more than 100 million people in the region into extreme poverty by 2030.² Urban expansion has resulted in the conversion and loss of forests, wetlands and other ecosystems and has increased the already high exposure to disasters, with poor and disadvantaged communities being the most severely affected.³ Contaminated drinking water affects about one third of the population in South and South-East Asia,⁴ while small island States face problems of limited drinking water as a result of sea-level rise. About 80-90 per cent of urban wastewater from developing countries in the region⁵ is discharged directly – without treatment – into surface water bodies.

These effects expose the limits of GDP as a measure of economic performance and social progress. If citizens are concerned about the quality of air, and air pollution is increasing, then statistical measures that do not account for air pollution will provide an inaccurate estimate of what is happening in terms of their well-being. Therefore, it is important to examine measures that can go beyond GDP to capture a country's natural capital and changes both in its natural wealth over time and in environmental degradation. Indeed, what is measured affects decision-making, so if measurements are flawed, decisions may also be distorted. This was the underlying premise of the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) aimed at assessing the the limits of GDP as a measure of societal well-being.⁶ CMEPSP concluded, among other things, that sustainability assessments require a well-identified "dashboard" of indicators based on the concept of "stocks". The United Nations Statistical Commission has elaborated international statistical standards for national accounts data to incorporate the dimension, which is captured by its System of Environmental-Economic Accounting.⁷

Figure 1 shows natural resource depletion – the sum of net forest depletion, energy depletion and mineral depletion of a country for a given year – and reflects the decline in asset values associated with the extraction and harvest of natural resources, analogous to the depreciation of fixed assets.⁸ Natural resource depletion is significant across countries in the region, reaching as high as 36 per cent of gross national income (GNI) in Solomon Islands, showing the extent to which economic growth has been achieved through significant disinvestment in a country's natural assets. While it is conceivable that some countries converted their assets into other types of savings, such as through sovereign wealth funds or the recycling of resource income by State-owned companies back into domestic investments, over time the rates of resource depletion observed are not sustainable and raise the issue of intergenerational equity. Moreover, although gross savings trends seem to be generally correlated with the depletion of resources (see figure 1), this may not be the case in some countries.

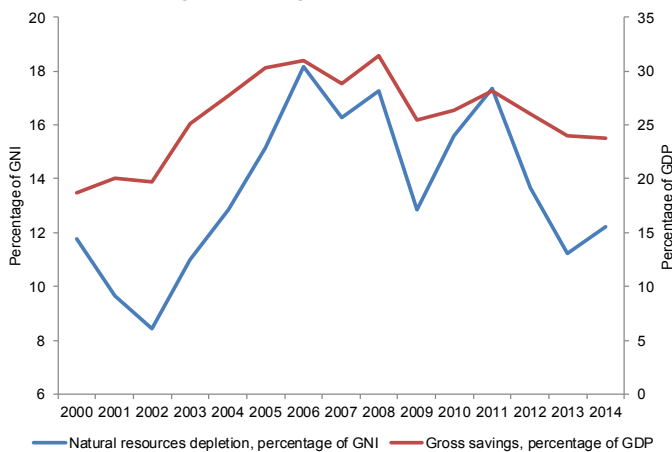
Figure 1. Countries with high resource depletion, 2014¹

A: High resources-depletion countries, 2014



Source: ESCAP, based on the data from World Development Indicators.

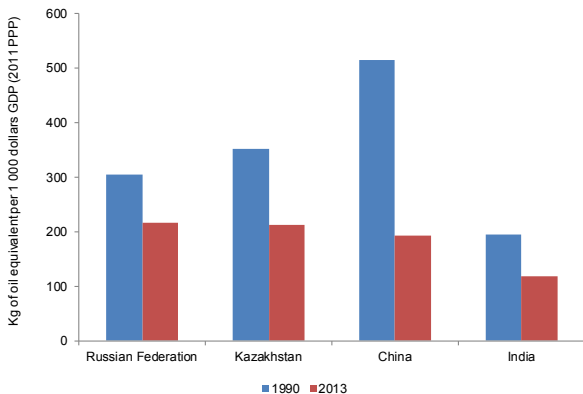
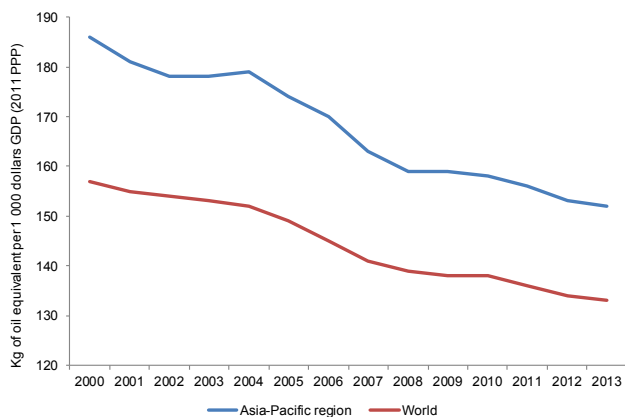
B: Conversion to gross savings, 2000-2014



Source: ESCAP, based on the data from World Development Indicators. Note: Panel B shows the median value of countries in panel A, excluding Bhutan, Papua New Guinea, Solomon Islands and Uzbekistan, for which full time series data are not available.

The region's energy intensity – the ratio of total primary energy supply (TPES) to GDP – remains high (see figure 2). Total energy intensity for the region was 152 kg of oil equivalent per \$1,000 GDP (2011 constant) in 2013, which is a decline of almost 20 per cent since 2000, but still above the global average. Fossil fuels – coal, oil and natural gas – continue to dominate total primary energy supply and its growth. Coal usage almost tripled, from 1,067 million tons of oil equivalent (Mtoe) in 1990 to 2,939 Mtoe in 2014, while the share of coal as a primary fuel grew from 32 to 43 per cent, compared with a more modest rise in the global average, from 25 to 29 per cent.

Figure 2. Energy intensity

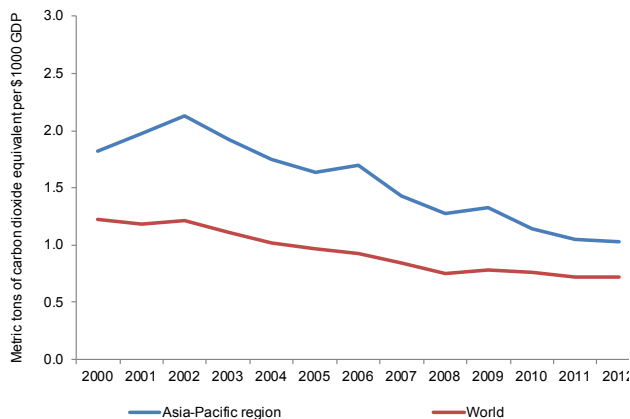


Source: ESCAP, based on the data from International Energy Agency. GDP figures are sourced from World Development Indicators.

The region already accounts for roughly half of global greenhouse gas (GHG) emissions, and the high-growth path on which many of the region's economies find themselves means that this contribution will grow unless there are fundamental policy interventions. Emissions intensity in the region has been decreasing faster relative to that of the world, but in 2012 was still about 1.4 times higher than global emissions intensity (see figure 3). The region's GHG emissions per capita increased from 4.4 metric tons in 2000 to 6.3 metric tons of carbon dioxide equivalent in 2012, no longer far from the global per capita average of 7.5 metric tons of carbon dioxide equivalent.

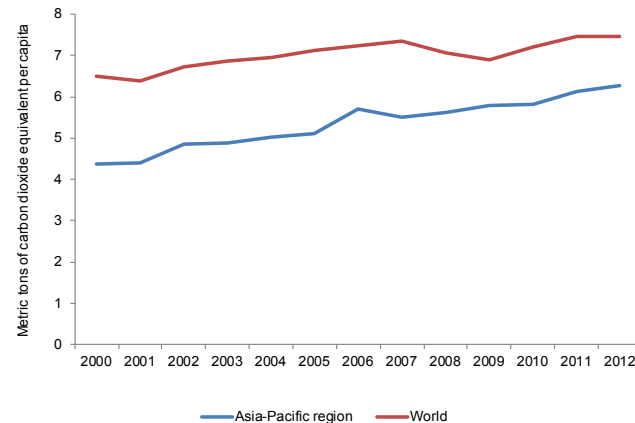
Figure 3. Carbon emissions, 2000-2012

A: Emissions intensity per unit of GDP



Source: ESCAP statistical database. Available from http://data.unescap.org/escap_stat.

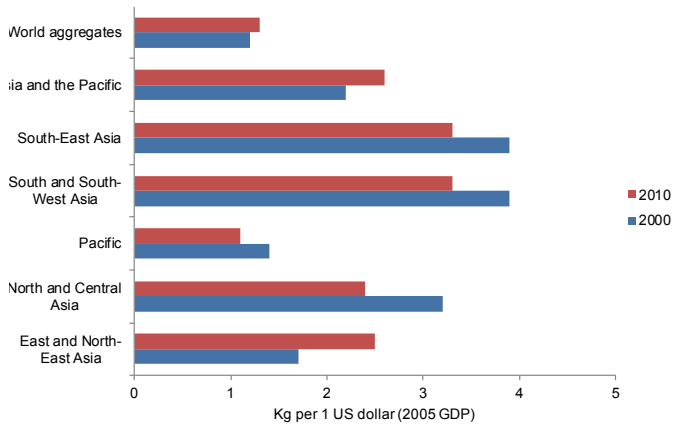
B: Emissions per capita



Source: ESCAP statistical database. Available from http://data.unescap.org/escap_stat

In terms of domestic material consumption, the Asia-Pacific region consumed about 53 per cent of the world's materials in 2010. The region needed 2.6 kg of materials to produce \$1.00 of GDP, which means it still lags behind the rest of the world where on average only 1.3 kg was needed (see figure 4). The regional average, however, masks wide ranges, from 17 kg per dollar in Mongolia to 0.3 kg per dollar in Japan, with the poorest countries that are also the most dependent on natural resources often exhibiting very low resource efficiency. The region's water use accounts for more than half of global water use. The relative sectoral shares of water consumption were 80 per cent for agriculture and 10 per cent each for industry and municipal use.⁹ Although water use is decreasing – due to improvements in the agricultural sector and irrigation – water intensity in the region's developing countries is still very high and, for the region as a whole, exceeds the global average by a factor of two.

Figure 4. Domestic material consumption



Source: ESCAP statistical database. Available from http://data.unescap.org/escap_stat.

Countries in the region are stepping up to the challenge of increasing energy- and resource-efficiency and tackling environmental degradation. Policy instruments can broadly be categorized as (a) regulatory; (b) market-based; and (c) voluntary or information-based. In practice, a mix of these policy instruments is employed to better achieve higher energy- and resource efficiency and improve environmental outcomes.

First, regulation is typically used to control hazardous point sources of pollution in air, water and land. Its advantage lies in exerting direct control over the environmental outcome it is seeking to address, which makes it ideal as an instrument to limit hazardous substances so that they do not exceed a specific amount set by scientific authorities for health considerations. Any pollution exceeding the ceiling levels would subject the polluter to fines. This type of instrument is information-intensive in that the regulator must regularly measure or spot-check the actual emission point sources at each installation. It is also inefficient relative to market instruments because – provided the emissions are below the established ceiling – it does not provide the polluter with any incentive to reduce emissions further, nor does it direct pollution abatement activities towards the lowest-cost polluter.

Examples from the region include Japan's Air Pollution Control Act, which stipulates allowable limits for automobile exhaust gas.¹⁰ The Republic of Korea's Green Procurement Policy, adopted in 2005, legally requires all public sectors to use sustainable products. As a result, between 2004 and 2010, the scale of green production has increased by a factor of four. Viet Nam's Law on Energy Efficiency and Conservation is aimed at achieving a 10 per cent reduction in energy intensity in energy-intensive industries and in codes for energy-efficient buildings.

Second, economic instruments rely on prices or markets to function and encompass taxes, subsidies and emissions trading systems (ETS). The advantage of market instruments concerns their superior allocative efficiency, the positive incentives that they provide and their revenue-generating ability. Emissions abatement falls first on those polluters that handle it in the most cost-efficient manner, which provides incentives to reduce pollution and emissions and to invest in environmentally friendly technologies. Market instruments are less information-intensive in that they require only regulators to set the price (in the case of a tax)

or the quantity (in the case of an ETS) of the relevant instrument, but this also gives them less control over the actual environmental outcome.

Examples from the region include the emissions trading systems for GHG emissions in China, Japan and the Republic of Korea, and the energy efficiency trading programme for major Indian industries known as the "Perform, Achieve and Trade" programme. Singapore plans to introduce a carbon tax from 2019, which will initially value a ton of carbon at between S\$ 10 and S\$ 20, which is approximately the level of carbon internal shadow pricing being adopted by a number of progressive private sector companies.¹¹ Experience suggests that these instruments need to be phased in slowly, with the tax rate increasing over time. Energy subsidies – especially on petroleum products and electricity – are prevalent in Asia, which accounted for about one third of global energy subsidies in 2013. In many countries in the region, fossil fuel subsidies account for a large share of GDP; for example, based on estimates for 2014, they accounted for about 20 per cent of GDP in the Islamic Republic of Iran, followed by the Russian Federation and India (both at about 10 per cent), Indonesia (7 per cent) and China (4 per cent). In the wake of the global oil price decline in 2014, a number of countries, including Indonesia, have aggressively phased out fuel subsidies.¹²

Third, voluntary and information-based measures include toxic release inventories or pollutant release and transfer registers, or "ecolabels", consumer awareness-raising campaigns and corporate sustainability reporting. One of the advantages of information instruments is the relatively low implementation cost compared with the complex administration needed to implement regulatory or market-based approaches. The limited costs involved in the use of such tools means they can be more easily employed by least developed economies. However, voluntary measures often have limited (sectoral) coverage and are sometime considered less effective than other measures.

Examples from the region include Thailand's carbon reduction label, which uses a lifecycle approach to give a measure of a product's contribution to GHG emissions, thus providing consumers with information that can help direct them towards less environmentally harmful purchases. Viet Nam has introduced mandatory labelling for certain market segments. The Singapore Packaging Agreement 2007 between the Government and the food and drink industry has led to the development of industry action plans and sets targets to reduce packaging waste from various packaging materials.

Priority policy actions for the region to achieve more sustainable growth include the following:

1. Pursue further energy subsidy reform and promote carbon pricing, that is, get the price right: Energy subsidies distort resource allocation decisions by encouraging wasteful fossil fuel consumption and reducing incentives for investment in renewable energy. In contrast, carbon pricing, either through carbon taxes or ETS, puts a price on the negative externality

generated by carbon-generating production activities. Such pricing encourages a shift in consumption to goods or services with lower carbon content, either for consumption or as input into the production process. Further, it provides a market signal that helps spur innovation in low-carbon products and processes (see also the section on East and North-East Asia in chapter 2 of the Economic and Social Survey of Asia and the Pacific 2017).

2. Enhance energy and water efficiency opportunities across various sectors: As buildings account for about a third of global total final energy consumption, and building stock is rapidly expanding in the region to accommodate population growth, economic growth and urbanization trends, there is huge potential for making energy efficiency improvements in the residential sector, especially in building design, heating and cooling, lighting and household appliances. In addition, the Asia-Pacific region is the world's manufacturing hub and therefore offers enormous potential for electricity savings from the institution of measures to improve industrial energy efficiency. Better water pricing policies that discriminate between high- and low-value users and that encourage lower use of water are needed to achieve water saving.

3. Put decoupling of resource use and economic growth at the centre of development planning and improve capacities for sustainable consumption and production: Innovative approaches to reducing, reusing and recycling wastes from cradle-to-grave and value-chain perspectives are vital to ensure sustainable consumption and production (SCP) patterns in line with Sustainable Development Goal 12. Institutional capacity-building at the national and local levels, financial support, especially for less developed countries, and technology and knowledge transfer and appropriate human resources development in support of SCP are essential.¹³

¹ For details, see UNEP Global Environment Outlook (GEO-6): Regional Assessment for Asia and the Pacific. Available from http://web.unep.org/geo/sites/unep.org/geo/files/documents/geo-6_ap_final_en_complete.pdf.

² For further information, see World Bank, *Shock Waves: Managing the Impacts of Climate Change on Poverty* (Washington, D.C., 2015). Newest estimates for the Asia-Pacific region show that climate change will cause significant impacts on growth. Without action on climate, GDP in the region could decrease by as much as 3.3 per cent by 2050 and 10 per cent by 2100, relative to the base case. See Asian Development Bank, *Asian Development Outlook 2016 Update: Meeting the Low-Carbon Growth Challenge* (Manila, 2016).

³ Estimates are from ESCAP, UN-Habitat and Rockefeller Foundation, "Pro-poor urban climate resilience in Asia and the Pacific: quick guide for policy makers". Available from www.unescap.org/resources/quick-guide-policy-makers-pro-poor-urban-climate-resilience-asia-and-pacific-0.

⁴ For additional details, see R. Bain and others, "Global assessment of exposure to faecal contamination through drinking water based on a systematic review", *Tropical Medicine and International Health*, vol. 19, No. 8, pp. 917-927. Available from www.ncbi.nlm.nih.gov/pmc/articles/PMC4255778/.

⁵ See ESCAP and UN-Habitat, *The State of Asian and Pacific Cities Report 2015: Urban Transformations - shifting from quantity to quality*. Available from www.unescap.org/sites/default/files/The%20State%20of%20Asian%20and%20Pacific%20Cities%202015.pdf.

⁶ For further information, see https://en.wikipedia.org/wiki/Commission_on_the_Measurement_of_Economic_Performance_and_Social_Progress.

⁷ For details, see <http://unstats.un.org/unsd/envaccounting/seea.asp>.

⁸ Adjusted net savings, including natural resources depletion, is an indicator calculated by the World Bank. The adjustments for capital depletion are not comprehensive in that they do not include some important sources of environmental degradation, such as underground water depletion, unsustainable fisheries and soil degradation. This results from the lack of internationally comparable data rather than from intended omissions. Net forest depletion is a unit resource rent times the excess of roundwood harvest over natural growth. Energy depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite and phosphate.

⁹ For further information, see ESCAP and others (2016).

¹⁰ See Japan, Ministry of Environment (www.env.go.jp).

¹¹ For example, in 2016 Mahindra and Mahindra became the first Indian company to implement an internal carbon fee of about \$10 per ton in order to help achieve its goal of reducing greenhouse gas emissions by 25 per cent over the next three years.

¹² Experience shows that six elements are common to successful reform efforts, namely improving delivery of social support through subsidy targeting and cash transfers; institutional reforms to facilitate market-level pricing of energy; appropriate phasing-in and sequencing of price increases, differentiating across energy products; facilitating improvements in energy efficiency; comprehensive energy sector reform with clear objectives together with a good understanding of its impacts and broad stakeholder consultation; and a transparent communications strategy.

¹³ Specific SCP initiatives in the region include the Asia Pacific Roundtable on Sustainable Consumption and Production and the European Commission funded the SWITCH-Asia Programme. At the country level, these include the National Action Plan for Sustainable Consumption and Production in the Philippines and Viet Nam, and national round tables in China, India and Viet Nam. The 10-year framework of programmes on sustainable consumption and production patterns (10YFP) has also propelled thematic programmes centred on sustainable buildings and sustainable tourism, sustainable lifestyles etc., for which there are regional components in the Asia-Pacific region. The concept of SCP is increasingly embedded in national strategies for sustainable development. For example, China has operationalized "circular economy" principles and pollution control into national pollution frameworks, while its "eco-civilization" strengthens this approach by integrating environmental protection into societal and environmental goals. Thailand set SCP as one of four national strategies of its Tenth National Economic and Social Development Plan.

The MPFD Policy Briefs aim at generating a forward-looking discussion among policymakers, researchers and other stakeholders to help forge political will and build a regional consensus on needed policy actions and pressing reforms. Policy Briefs are issued without formal editing. The content of this issue was prepared by Laura Altinger of the Environment and Development Division, Daniel Jeongdae Lee of the Macroeconomic Policy and Financing for Development Division, with research assistance from Achara Jantarasengaram. For further information on this issue, please contact Hamza Ali Malik, Director a.i., Macroeconomic Policy and Financing for Development Division, ESCAP (escap-mpdd@un.org).