



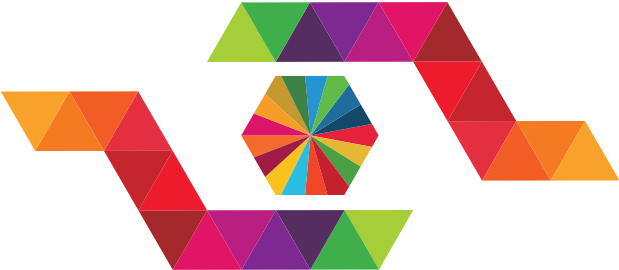
# THE ECONOMICS OF CLIMATE CHANGE IN THE ASIA-PACIFIC REGION





*The shaded areas of the map indicate ESCAP members and associate members.*

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Advance Copy for the first session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA 1), the twenty-second session of the Conference of the Parties (COP 22) and the twelfth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP 12), Morocco, 7-18 November 2016.

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The leadership of countries from Asia and the Pacific was vital in making the Paris Agreement a reality. Indeed, Fiji was the first country in the world to ratify the Agreement. The region is now set to play a key role in implementing the Paris Agreement. But this represents a major challenge for a region that is, on the one hand, the most vulnerable in the world to the impact of climate change, and that, on the other hand, contributes over half of the world's total greenhouse gas emissions. Six out of the ten top global emitters are in the Asia-Pacific region.

Limiting temperature increases to well below the two degree limit agreed to in Paris requires emissions to decline globally by 40 to 70 per cent below current levels by mid-century. To play its part in this, the Asia-Pacific region must base its future economic prosperity on creating the systems, technologies and capacities that cannot only revive or maintain growth, but also ensure inclusive, resilient and low-carbon approaches.

Stepping up to this challenge in the Asia-Pacific region requires a stronger understanding of the economics of climate change. The costs of inaction are estimated to reach as much as 10 per cent of our GDP by the end of the century. The estimated investment required to achieve the two degree target is 4 per cent of GDP over the same time period. Developing and prioritising national emissions reduction actions that are cost-effective and aligned with sustainable development strategies is pivotal to collectively achieve climate goals. Importantly, this also requires identifying, quantifying and harnessing the multi-sectoral co-benefits of emissions reductions, notably reducing the air pollution that is impacting urban dwellers in our major cities.

While the knowledge base on the economics of climate change is still evolving, national best practices in the use of economic approaches are emerging across the region. Enhancing regional understanding in this area will allow policymakers to prioritise the optimal mix of low cost and efficient abatement and adaptation initiatives. In turn this will reinforce the increasing ambition and effectiveness of Asia-Pacific countries' Nationally Determined Contributions.

This report recommends five key actions to address climate change in the Asia-Pacific region: 1) ensure adaptation to climate change and improve resilience; 2) phase out fossil fuel subsidies; 3) encourage renewable energy and energy efficiency; 4) implement carbon pricing; and 5) expand climate finance. These recommendations require strong political leadership and effective sectoral policy reform. The report also points to some leading examples of actions already being taken by countries in the Asia-Pacific region towards these priorities. Some countries, such as Indonesia and India, have already undertaken fossil fuel subsidy reform, while others have focused on adopting renewable energy on a broad scale, most notably China.

Regional cooperation will be instrumental to building capacities and sharing knowledge, particularly with and among the least developed countries, but also in coordinating more ambitious region-wide solutions in finance, technology, infrastructure and resilience. Action by many larger economies will generate positive spillovers for smaller economies such as access to lower-cost technologies, policy experience and other public goods.

The Asia-Pacific region is preparing to play its part in the global solution to climate change, while at the same time pursuing sustainable development through the framework of the 2030 Agenda. ESCAP is fully committed to support its fifty-three member States in realizing their climate change and resilience ambitions, in particular the least developed countries and small island developing States through capacity-building, policy dialogues and the sharing of experiences and information.

Shamshad Akhtar  
Under-Secretary-General of the United Nations and  
Executive Secretary, United Nations Economic and  
Social Commission for Asia and the Pacific



## HIGHLIGHTS

The Asia-Pacific region is at the forefront of the impacts of climate change and is uniquely positioned in global efforts to manage climate change. Higher temperatures, sea level rise, and extreme weather events linked to climate change are having a major impact on the region, harming its economies, natural and physical assets, and compounding developmental challenges, including poverty, food and energy security and health. Without climate-oriented development, climate change could force more than 100 million people from the region into extreme poverty by 2030, wiping out the gains in poverty reduction achieved over the last decades. At the same time, the region accounts for 53 per cent of global emissions and the high-growth path on which many of the region's economies themselves on, means this contribution will grow without fundamental policy interventions.

The economics of climate change offers critical insights into the costs and benefits of both inaction and action on climate change. Since the seminal work by Stern in 2006, our understanding has further evolved. Estimates of the costs of inaction have gone up, while those of action have decreased, mainly due to lower technology costs. We also have a better understanding of efficiency savings and significant co-benefits that can be reaped in transitioning to a low-carbon, climate-resilient economy.

Newest estimates for the Asia-Pacific region show that growth will be significantly impacted by climate change. Without climate action, 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. The economic costs associated with disasters across the region are also increasing. Damage to property, crops and livestock from disasters increased from US\$52bn annually to over US\$523bn between 1970 and 2015. The costs of attaining a 2°C scenario for the region are estimated at approximately 0.1 per cent of GDP annually or 4 per cent by 2050, relative to business as usual. The co-benefits of climate action offset many of the costs of emissions reduction and emerging advanced technologies offer future prospects of lower abatement costs.

Taking into account the urgency of the climate change challenge and the focus on implementation subsequent

to the entry into force of the Paris Agreement, countries in the region are no longer looking at what should be done, but rather how it can be done. To facilitate this, this paper identifies five key priority areas of the climate change response for the Asia-Pacific region, and the economic policies and instruments that can be used to achieve them. First, adaptation to climatic changes and improved resilience are the most immediate challenges. Second, priority must be placed on pricing carbon to provide long-term incentives for economic actors to switch to low-carbon pathways. Third, countries should phase out fossil fuel subsidies, as their distortionary effect hinders energy efficiency and clean energy alternatives. Fourth, initiatives to accelerate the uptake of renewable energy and energy efficiency solutions are needed for emissions reductions, energy security and energy access. Fifth, adequate climate financing is required to allow the region to realize its climate ambition and take advantage of the opportunities that climate change offers.

Regional cooperation will help address many of these issues and enhance the ongoing national effort to implement ambitious climate change actions. Regional cooperation has a role in addressing the harmonization of carbon pricing initiatives and possible linking of markets, as well as in developing internationally transferred mitigation outcomes (ITMOs), increasing technology cooperation, implementing SDGs, and helping raise climate ambitions by tapping into subnational networks including cities, companies and civil society.

### **1. Ensure Adaptation to Climate Change and Improved Resilience**

Regardless of the progress made in mitigation efforts by the global community over the coming decades, climate change is already occurring. Adapting to climate change is therefore essential. Striking the right balance between mitigation and adaptation investments is an ongoing challenge for policymakers, especially in the Asia-Pacific region. Adaptation efforts can take several forms – altering farming practices and crop varieties, building water reservoirs, enhancing water use efficiency, changing building codes, or constructing sea walls. Adaptation to climate change and putting in place multi-hazard early warning systems provides largely local benefits.

There are two critical areas for adaptation in the region, agriculture and cities. A good deal of autonomous adaptation to climate change in the region's agricultural sector is already being observed, including the adoption of measures such as changes in sowing dates, a switch to drought-tolerant or flood-resistant crops, and the use of salinity-tolerant varieties of rice. Despite this, the rural poor, who have the lowest capacity to undertake adaptation, will remain among the worst affected by the impacts of climate change. There is a need for policy to enable and empower this group to better withstand and adapt to the climate risks, e.g. through diversifying their household incomes and providing access to microfinance, insurance or social safety nets. The economics of adaptation shows that governments hold the responsibility of making the long-run decisions about investing in adapting infrastructure to withstand the impacts of climate change, better disaster risk management, effective land-use planning, and facilitating as well as disseminating relevant knowledge on future climate change, technology and conditions to support adaptation in cities.

Effective adaptation interventions represent good development and, tend to be no-regret measures that would have been undertaken even in the absence of climate change. While it is difficult to arrive at an aggregate estimate of the costs and benefits of agricultural adaptation in the region, modelling work in the region suggests benefits in the value-added of the sector could be large, even reaching 10 per cent. The damage costs of flooding exacerbated by climate change are likely to be substantial to cities and in the range of 2 to 6 per cent of regional GDP.

## **2. Phase Out Fossil Fuel Subsidies**

Phasing out fossil fuel subsidies should be at the top of the region's policy reform agenda. Subsidies on fossil fuels distort incentives in favour of fossil fuels at the expense of cleaner energy. They have large negative economic, social and environmental impacts. Beyond their contribution to fiscal imbalances and public debt, subsidies depress investment in the energy sector, which can hamper energy supply and exacerbate economic losses. International experience suggests that successful fossil fuel subsidy reform will be part of a larger energy sector reform agenda. Elements for successful reform include social support through subsidy targeting and cash transfers; institutional reforms to facilitate market-level pricing; facilitating improvements in energy efficiency and a transparent communications strategy.

Limited carbon budgets to keep the world within the internationally agreed temperature goal suggest that

only about one-fifth of total global coal reserves can be exploited up to 2050. Efforts must be made to keep much of that coal in the ground and the region will be a key to this undertaking considering that currently about 85 per cent of its electricity generation is sourced from coal. Currently, the fiscal gain from removing energy subsidies amounts to around 10 per cent of the region's GDP, and in terms of share of government revenue, it exceeds 30 per cent. For the Asian region, eliminating subsidies (together with carbon pricing) would have many co-benefits, including reducing CO<sub>2</sub> emissions by 18-25 per cent, and air pollution deaths by around 55-60 per cent. The resulting welfare gains are also significant, in the range of 5-7 per cent of regional GDP.

## **3. Encourage Renewable Energy and Energy Efficiency**

To encourage energy efficiency and renewable energy take-up, experience in the region shows that a policy mix of targets, regulations, standards, labelling and fiscal incentives work well to accelerate energy efficiency improvements. As fossil fuel subsidies are phased out and carbon pricing gains hold, prices approach their real costs, making energy efficiency improvements more desirable. For renewable energy investments, providing clear long-term policy signals, overcoming the region's high cost of capital and shortage of long-term investment capital, and de-risking investments, are important to catalyze private sector investments. This can include guarantees, subsidized loans or regulatory targets such as portfolio targets.

Macroeconometric models have attempted to quantify the benefits of reaching the three goals of sustainable energy for all (SE4ALL) contained in SDG6. Globally, this would lead to an increase in GDP of 1.1 per cent, and in global welfare of at least 2.7 per cent, boost direct and indirect employment in the sector to 24 million, and enhance trade. A study for Japan found that adding 23.3 GW of solar PV would lead to an increase of almost 1 per cent in national GDP. For the region, most of the positive GDP impact stems from increased investment in renewable energy deployment, and is found to be higher if it entails a higher rate of electrification. The welfare impact is found to be much higher (4-8 per cent relative to the baseline) in individual countries in the region, especially India, Indonesia, China and Japan, mainly due to the reduced health impact of air pollution. These gains would be further magnified if this objective was met by expanding energy access. The number of jobs in the sector would also be roughly doubled in the five countries of the region included in the study, creating an additional 6.6 million jobs.

#### 4. Ensure Effective Carbon Pricing

Carbon pricing is a key reform to correct the underlying market failure of climate change. Pricing carbon economy-wide results in price signals that drive low carbon pathways by businesses and consumers, and stimulates clean technology and process innovation, while also supporting long term behaviour change. Credible and long term carbon prices have the potential to induce fundamental and long term shifts in infrastructure, technology and behaviour, which form the basis of a low carbon economy. Many countries in the region have implemented emission trading schemes at sub-national or national levels and others are under development. The main policy imperative is to increase the effective carbon prices across key countries in the region as these are currently too low to provide adequate incentives to pursue a low-carbon path, and to expand carbon markets by linking them to each other to reap greater cost efficiency opportunities. Carbon pricing can raise valuable public revenue through the auction of permits and the collection of carbon taxes. Estimates suggest that the introduction of the new national ETS in China would potentially double the total value of ETSS and carbon taxes globally to about US\$100bn. Additional economic benefits depend on how the revenue collected is used. Studies are consistently showing that among the various instruments available to reduce CO<sub>2</sub> emissions, carbon prices are the most likely to produce economic growth and increase the level of productivity.

#### 5. Climate Finance

As climate change continues to progress and extreme weather events become more frequent and more severe, the need for adaptation finance for developing countries also continues to grow. At current estimates, adaptation finance needs of developing countries are in the range of US\$140bn to US\$300bn per annum. On top of this, incremental investment from 2015 to 2050 to decarbonize the Asian energy sector alone is estimated at a net US\$21tr or US\$600bn per annum. But, compared to annual GDP, these amounts are relatively modest ranging from 0.1 per cent today to 4 per cent by 2050, mainly because the benefits of decarbonisation include higher energy efficiency, lower fuel costs and lower operating expenditures as well as substantial health benefits from reduced air pollution and its associated economic and health impacts. Scaling up climate finance will require identifying and addressing the barriers to investment and access to finance. Adequate carbon pricing and the integration of long-term policy frameworks for the low-carbon transition into national planning and budgeting will be important elements to support climate investment. Financial regulation will also play an important role in easing the risks for private investors thereby unlocking private finance, as will green bonds. Grant finance should be used increasingly to catalyze other sources of financing rather than as standalone project finance and vulnerable countries in the region require additional help to ensure that they can access available sources of grant financing.

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