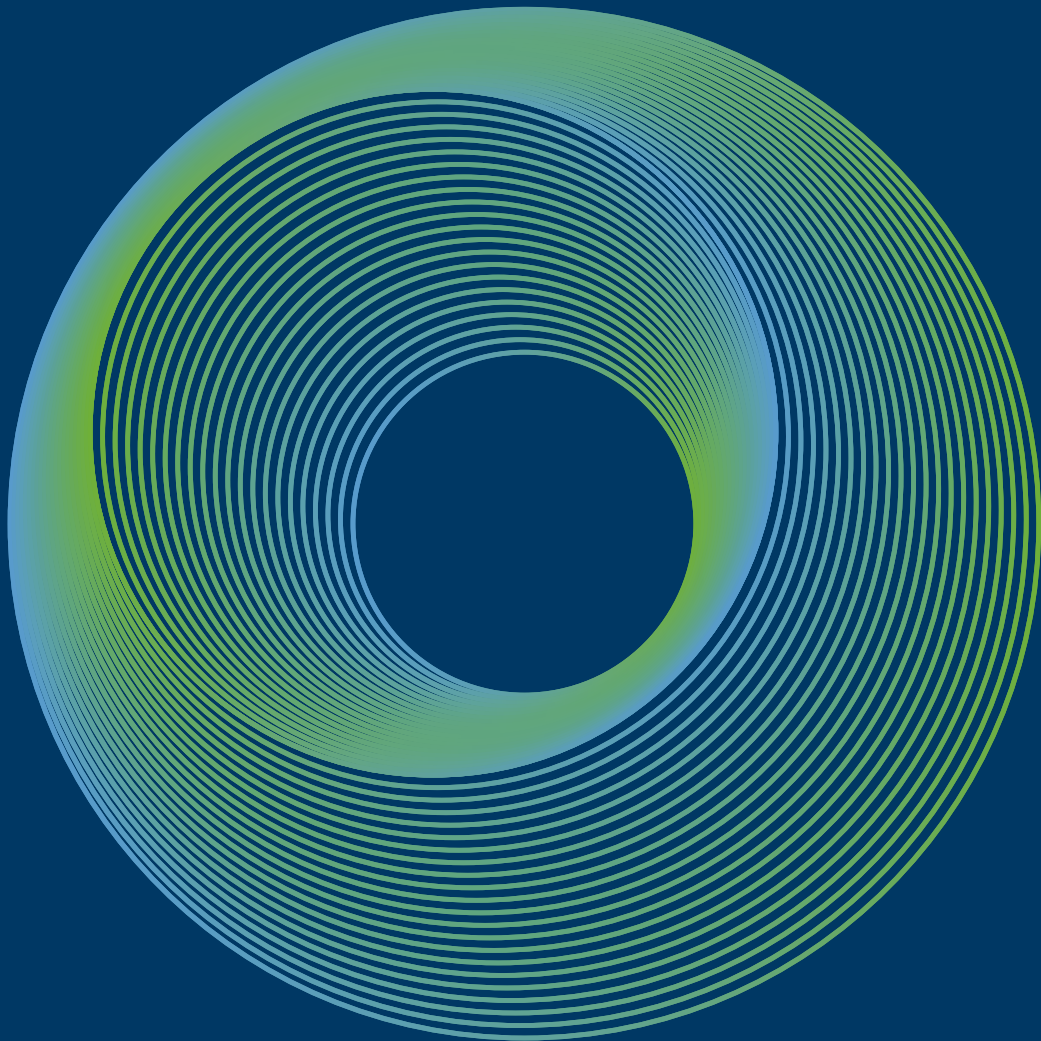




79th Commission
Session

THE RACE TO NET ZERO

Accelerating Climate Action
in Asia and the Pacific



ESCAP
Economic and Social Commission
for Asia and the Pacific



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

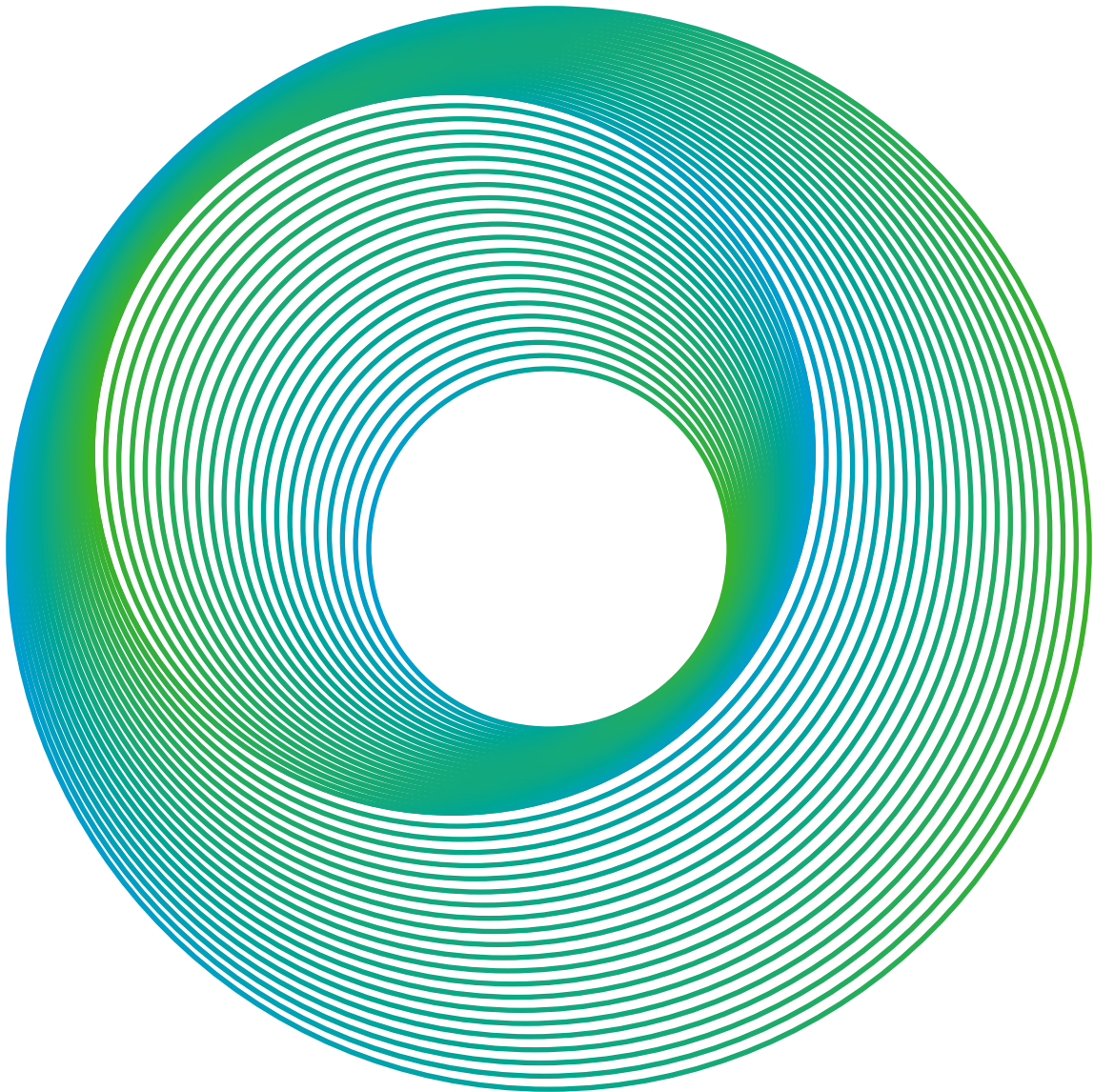
The Economic and Social Commission for Asia and the Pacific (ESCAP) is the most inclusive intergovernmental platform in the Asia-Pacific region. The Commission promotes cooperation among its 53 member States and 9 associate members in pursuit of solutions to sustainable development challenges. ESCAP is one of the five regional commissions of the United Nations.

The ESCAP secretariat supports inclusive, resilient and sustainable development in the region by generating action-oriented knowledge, and by providing technical assistance and capacity-building services in support of national development objectives, regional agreements and the implementation of the 2030 Agenda for Sustainable Development.

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in Asia and the Pacific**



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THE RACE TO NET ZERO

Accelerating climate action in Asia and the Pacific

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FOREWORD



Armida Salsiah Alisjahbana
Under-Secretary-General of the United Nations
and Executive Secretary of ESCAP



Nowhere is the global climate emergency more immediate than in Asia and the Pacific. Climate-induced disasters sweep across the region with ever-increasing force and frequency. Lives are lost, communities displaced and people's health damaged. As vital livelihoods, infrastructure and services are disrupted, the most vulnerable are left cruelly exposed and the economic costs are phenomenal. In the region responsible for more than half of global greenhouse gas emissions, with economies powered largely by fossil fuels, climate change is exacerbating poverty and imperiling sustainable development. Now is the time to step up the region's climate action.

If the urgency is clear, the context is challenging. The COVID-19 pandemic was hard felt in Asia and the Pacific and the crisis in Ukraine continues to cause a great deal of uncertainty. As governments work to consolidate a recovery, they must contend with multiple challenges. Yet the existential threat posed by climate change means the region's response cannot be postponed. Measures to put the economies of Asia and the Pacific on a low-carbon pathway, and adapt and become more resilient to the impacts of climate change, must be front and centre of the region's post-pandemic recovery.

The race to net zero focuses on three key sectors from which greenhouse gas emissions must be reduced and how this can be done. It considers how the energy sector can end its dependency on coal and phase out other fossil fuels; how to support low-carbon mobility and logistics; and how international trade and investment can help accelerate the transition of the region's industries to a low-carbon future. Concrete proposals are made as to how these major shifts can be financed and how better to measure challenges and progress.

The proposals are grounded in regional cooperation. The present report presents recommendations on building regional frameworks or partnerships on green power corridor, low-carbon transport, and a low-carbon and climate-smart transition, and collaborating on policies for climate-smart trade and investment, climate finance and monitoring.

This report sets out an ambitious agenda. Containing temperature rises to 1.5°C and achieving net-zero emissions by mid-century requires nothing less. Our hope is that the analysis and proposals in this report can help raise ambition and accelerate climate action in every corner of Asia and the Pacific.



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ACRONYMS

| | |
|--------------------------|---|
| ACE | Action for Climate Empowerment |
| AIGCC | Asia Investor Group on Climate Change |
| APEC | Asia-Pacific Economic Cooperation |
| APG | ASEAN Power Grid |
| ADB | Asian Development Bank |
| ASEAN | Association of South-East Asian Nations |
| BCBS | Basel Committee on Banking Supervision |
| BTA | border tax adjustment |
| CBAM | Carbon Border Adjustment Mechanism |
| CCRI | Children’s Climate Risk Index |
| CDP | Carbon Disclosure Project |
| CDSG | Climate Disclosure Standards Board |
| CISAT | Climate Change Statistics and Indicators Self-Assessment Tool |
| CNG | compressed natural gas |
| COP | Conference of Parties |
| CO₂ | carbon dioxide |
| ESCAP | Economic and Social Commission for Asia and the Pacific |
| ESG | environmental, social, and governance |
| ESRM | environmental and social risk management |
| FDI | foreign direct investment |
| FOLU | forest and other land use |
| GDP | gross domestic product |
| GFANZ | Glasgow Financial Alliance for Net Zero |
| GSS | green, social and sustainability |
| GtCO_{2e} | gigaton of carbon dioxide equivalent |
| IEA | International Energy Agency |
| IGCC | Investor Group on Climate Change |
| IIRC | International Integrated Reporting Council |
| ILO | International Labour Organization |
| IMF | International Monetary Fund |
| IMO | International Maritime Organization |
| IPCC | International Panel on Climate Change |
| IPG | International Partner Group |
| IPO | initial public offering |
| IR | Integrated Reporting |
| IRENA | International Renewable Energy Agency |





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|-----------------|--|
| JETP | Just Energy Transition Partnership |
| kg | kilogram |
| LDAR | leak detection and repair |
| LT-LEDS | long-term low-emissions development strategies |
| LNG | liquefied natural gas |
| LPG | liquefied petroleum gas |
| MaaS | Mobility as a Service |
| MEPS | minimum energy performance standards |
| MRV | measurement, reporting and verification |
| NAP | national adaptation plans |
| NbS | nature-based solutions |
| NDC | nationally determined contributions |
| NSO | national statistical office |
| NTM | non-tariff measures |
| OECD | Organisation for Economic Co-operation and Development |
| PRI | Principles for Responsible Investment |
| PV | photovoltaic |
| RCP | Representative Concentration Pathways |
| RIMES | Regional Multi-hazard Early Warning System for Asia and the Pacific |
| RTA | regional trade agreement |
| SASB | Sustainability Accounting Standards Board |
| SBTi | Science-based Targets initiative |
| SLBs | sustainability-linked bonds |
| TCFD | Task Force on Climate-related Financial Disclosures |
| UNCTAD | United Nations Conference on Trade and Development |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Fund |
| UN WOMEN | United Nations Entity for Gender Equality and the Empowerment of Women |
| U4E | United for Efficiency |
| WBCSD | World Business Council for Sustainable Development |
| WRI | World Resources Institute |
| WTO | World Trade Organization |
| WWF | World Wide Fund for Nature |



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EXECUTIVE SUMMARY

I. Responding to a climate emergency

Asia and the Pacific joins the race to net zero in challenging circumstances. The coronavirus disease (COVID-19) pandemic and the ensuing economic crisis have upended lives across the region and pushed 85 million people into extreme poverty. The crisis in Ukraine has disrupted global supply chains, driven up inflation and created unwelcome uncertainty. It has led to food and commodity price volatility, depreciating currencies and a constrained financial environment. Policymakers are focused on economic recovery, supporting growth and creating jobs. Yet the magnitude of the climate emergency is such that climate action cannot be postponed. Measures to set economies on a low-carbon pathway and to make them resilient to climate change and more inclusive must be front and centre of the region's post-pandemic response.

While the climate emergency is global, nowhere is the need for greater ambition to respond to climate change more urgent than in Asia and the Pacific. Over the past 60 years, temperatures in the region have increased faster than the global mean. Extreme, unpredictable weather events and natural hazards have become more frequent and intense. Tropical cyclones, heatwaves, floods and droughts have brought tragic loss of life, displaced communities, damaged people's health and pushed millions into poverty. Of the 10 countries most affected by these disasters, 6 are in the region, where food systems are being disrupted, economies damaged and societies undermined. Left unchecked, climate change will exacerbate the strains of ongoing overlapping crises and imperil sustainable development.

In the absence of decisive action, climate change will remain a central driver of poverty and inequality across the region. Most countries in Asia and the Pacific are insufficiently prepared. They lack the financial means to support adaptation and mitigation efforts and the data necessary to inform climate action. Existing infrastructure and services are insufficiently climate resilient. Across the region, the average annual economic losses caused by natural and biological hazards are estimated at \$780 billion.¹ This is forecast to rise to \$1.1 trillion in a moderate climate-change scenario and \$1.4 trillion in a worst-case scenario. In terms of the share of gross domestic product, Pacific small island developing States, which already shoulder the heaviest burden of natural and biological hazards, are set to face the largest economic losses.

Asia and the Pacific accounted for more than half of global greenhouse gas emissions in 2020. The region's share continues to increase as populations grow and economies continue to be powered by fossil fuels. Emissions have more than doubled since 1990, driven by the electricity generation, manufacturing and transport sectors. According to the Intergovernmental Panel on Climate Change in its Sixth Assessment Report and the Emissions Database for Global Atmospheric Research,² the region accounted for 57 per cent of global emissions from fuel combustion in 2020, three fifths of which were generated from coal. The share of manufacturing and construction in regional greenhouse gas emissions is twice as high as in the rest of the world. Transport-related emissions in the region have led regional greenhouse gas emissions to increase by 40 per cent over the past decade, as demand for passenger and freight transport has expanded.

Global greenhouse gas emissions must be reduced by 45 per cent by 2030 compared to 2010 levels to keep the world within a temperature rise of 1.5°C above pre-industrial levels and abide by the Paris Agreement. Achieving this objective depends on the greenhouse gas emission trajectory of Asia and the Pacific. Yet the sum of countries' actions in nationally determined contributions to cut emissions and adapt to climate change falls short of the required ambition. In fact, a 16 per cent increase in greenhouse gas emissions from 2010 levels is forecast, a world away from the reductions needed.

Adaptation plans and early warning systems reduce vulnerability to the impacts of climate change and deliver a huge return on investment. Investment in early warning systems to mitigate climate hazards, avoid humanitarian crises and protect development gains is an immediate necessity. Such systems have helped to reduce the death toll more than 100-fold over the past four decades in Bangladesh and have mitigated the damage these inflict by helping communities to move their properties and assets to safer areas. Yet existing early warning systems are simply insufficient, meaning that too many people are left exposed, particularly in small island developing States. Ensuring that early warning systems cover all communities in Asia and the Pacific must be a priority. The cost of increasing the coverage of multi-hazard early warning systems is far outweighed by the cost of inaction.

II. Closing emission gaps in key sectors

A. Accelerating the energy transition

Eighty-five per cent of the region's primary energy supply came from fossil fuels in 2020, according to the International Energy Agency.³ Coal accounted for over 40 per cent of the total energy supply but was responsible for over 60 per cent of the region's energy-related carbon dioxide emissions. One third of the region's emissions came from natural gas and oil. To limit temperature rises to 1.5°C, oil and gas need to be radically phased down by 2050 and coal completely phased out.

The rapid uptake of renewable energy requires the restructuring of national energy systems, new technical capacities and significant investment in supply and infrastructure. At present, investment is insufficient and more ambitious commitments to phase out fossil fuels, scale up renewable energy and improve energy efficiency are needed, requiring the allocation of greater financial resources. In existing nationally determined contributions, there is a large gap between countries' unconditional commitments and their conditional commitments that would make the 1.5°C objective achievable. In least developed countries, international technical and financial support remains critical to bridge this gap, but it has yet to materialize at the necessary scale.

Cross-border electricity grids can increase the share of renewable energy. A higher share of renewable energy also requires more flexible, responsive grid systems. Increased cross-border connectivity and multilateral energy trading would enable the increased use of wind and solar power. This would expand the area in which electricity supply and demand are balanced, thereby making renewable energy more affordable and accessible. Such cross-border electricity markets require enabling frameworks, including intergovernmental agreements on energy cooperation and interconnection, and the coordination and harmonization of institutional policies and regulatory regimes. The secretariat, therefore, proposes developing a regional green power corridor framework to determine scenarios for the increased deployment of renewable energy through cross-border power systems. The framework would include principles to align power system connectivity with national sustainable development agendas. Strengthened multilateral institutions are also needed to develop and regulate market mechanisms and coordinate power system operations.

The heavy reliance on fossil fuels in the industrial sector is a major hurdle, particularly in steel and cement production. Electrification is critical, including the use of electric furnaces to process recycled steel or a shift to hydrogen-based production methods. Across industrial sectors, Governments should incentivize research and development, and the uptake of low-carbon technologies.

Improved energy efficiency can reduce greenhouse gas emissions while meeting growing energy demands. In 2020, the region's carbon intensity was higher than all other regions and 27 per cent more than the global average, according to data from the International Energy Agency and the World Bank.⁴ Improved energy efficiency is a cost-effective way to reduce greenhouse gas emissions, meet growing energy demand, lower exposure to energy price fluctuations and support energy security. Broader application and more ambitious minimum energy performance standards could significantly improve the energy efficiency of lighting, appliances and equipment and remove inefficient technologies from the market. To be effective, minimum energy performance standards must be complemented by policies to incentivize the uptake of efficient products. Minimum energy performance standards for air conditioners, lighting motors, refrigerators and boilers could achieve the bulk of appliance-related energy savings. The harmonization of minimum energy performance standards and standardized labelling are being pursued by the Association of Southeast Asian Nations (ASEAN); they are initiatives on which the rest of the region could build.

To reduce carbon emissions in the building sector, it is essential that energy efficiency codes be moved towards net-zero emissions. For new constructions by 2030 and that existing building stock be upgraded. National and local building regulators should support this drive by developing and implementing mandatory codes based on local climate conditions to ensure accelerated progress. Currently, most countries in the region lack codes for building performance. The building sector requires energy performance standards, renewable energy requirements and a life-cycle carbon assessment of construction materials and operations.

Climate risk analysis and planning are needed to build greater climate resilience within existing and future energy systems. Power plants and electrical grids across the region are exposed to multi-hazard risks, and climate change is shifting environmental conditions, which have longer-term implications for regional energy systems. Hydropower, which holds the largest share of the region's installed renewable energy capacity, is becoming increasingly unreliable. Climate risk analysis and planning is, therefore, necessary for all economies. Using it to modernize existing infrastructure can help to climate-proof energy systems, increase generation efficiency and capacity, and offer greater grid flexibility.

B. Towards low-carbon mobility and logistics

Putting the transport sector on a low-carbon pathway remains challenging. The sector is fragmented and powered primarily by oil. To reach net-zero carbon by 2050, carbon dioxide emissions from transport need to decrease by at least 3 per cent annually. In Asia and the Pacific, transport emissions have increased by 200 per cent over the past three decades due to the rapidly growing demand for passenger and freight transport. Transport carbon dioxide emissions constitute 27 per cent of the region's total emissions and are above the global average. According to estimates by the International Transport Forum, demand for transport is forecast to increase by 150 per cent between 2015 and 2050, leading to a rapid increase in transport-related carbon dioxide emissions in the absence of a rapid transition to low-carbon transport solutions.⁵

Nonetheless, it is possible to put the transport sector on a low-carbon pathway in Asia and the Pacific by reducing transport distance through integrated land use and transport planning and changes in route choice, shifting to sustainable transport modes with low-carbon or net-zero-carbon emissions and improving vehicle and fuel efficiency. Policies must focus on five broad areas: (a) improved design, operations and planning of transport systems; (b) electrification; (c) low-carbon fuels and energy; (d) changing transport modes; and (e) innovation and upscaling. Ultimately, policies must change travel behaviour for passenger transport and logistics operations for freight transport, while improving vehicle, fuel and system efficiencies.

Immediate action is needed to develop and integrate a broad set of transport-related climate action policies into nationally determined contributions and to guide the transition of the sector to net-zero carbon. Integrated land use and transport planning needs to take into account public transport options that shorten distances travelled and change behaviour if reductions in passenger transport-related carbon dioxide emissions are to be achieved. Doing so would entail linking public transport services to improved walking and cycling infrastructure and making advanced vehicle technologies powered by renewable fuels available for public and private use. This integration would encourage public transport use and improve the efficiency of transport networks.

Improved fuel efficiency of motor vehicles is crucial to reducing carbon dioxide emissions. Tighter fuel economy standards are needed as a transitional step prior to electrification. With this in mind, the *ASEAN Fuel Economy Roadmap for the Transport Sector 2018–2025 with Focus on Light-Duty Vehicles*⁶ is aimed at transforming the light-duty vehicle market in the ASEAN region into one of the world's most fuel efficient. The goal is to reduce the average fuel consumption of new light-duty vehicles sold in the ASEAN region by 26 per cent between 2015 and 2025. The electrification of two- and three-wheelers in Asia and the Pacific is already well under way, led by China and India. Policy interventions and technological advancements have reduced the cost of owning an electric vehicle, extended vehicle range and enabled faster battery charging. The electric bus market is also growing. According to the International Energy Agency, China has almost 600,000 electric buses, and electric bus sales in India, Japan and the Republic of Korea have increased exponentially.⁷

The freight transport sector, especially long-haul freight, is harder to put on a low-carbon pathway than the passenger transport sector. While some countries in the region have begun implementing climate action in this area, freight transport needs to be given greater priority. The right incentives for the private sector are essential to reduce freight emissions. Road freight is the main type of freight transport in most countries and is the second-largest contributor of global transport carbon dioxide emissions after passenger road transport. Reducing road freight transport emissions requires improved energy and vehicle efficiency and performance standards. A shift from road to rail transport for freight is another effective means of lowering the carbon cost of transport, as rail consumes only one third of the fuel used by road freight.

Innovative transport technologies should complement measures to increase energy efficiency and electrification. These include passenger information systems, automatic toll payment, congestion charging, digitally enabled real-time route planners, and contactless and paperless border crossing. Investment in digital infrastructure will enhance the flexibility and responsiveness of transport systems, but should also be coupled with measures that will improve accessibility and enhance information technology literacy. Intelligently implemented, innovative transport systems will reduce energy consumption and carbon dioxide emissions, along with road congestion and air pollution.

Measures to decarbonize the transport sector should improve the resilience of transport infrastructure and provide inclusive transport services, including for women transport users. As the impact of climate change and extreme weather events increases, so should relevant training for the transport community and workforce. Cross-sectoral climate change partnerships involving all governance levels and the private sector are needed to grow institutional capacity. Climate risk-assessment analysis needs to be integrated into transport planning and infrastructure design processes. Policies supporting gender equality among transport users must respond to the differences in travel behaviour of men and women. Changes in public transport operations are required to adjust schedules, implement safety regulations and conduct gender analyses for transport policies.

Regional cooperation through the exchange of best practices and relevant data and information will support countries in aligning low-carbon transport policies to achieve climate goals faster. With this goal in mind, the Economic and Social Commission for Asia and the Pacific launched two initiatives in 2022: (a) the regional cooperation mechanism on low-carbon transport, which is aimed at promoting low-carbon mobility and contributing to transport emission reductions by helping countries to develop policies for low-carbon mobility, clean energy technologies and logistics, and (b) the Asia-Pacific initiative on electric mobility, which supports developing countries in the region by providing expertise, technological know-how and the financial means to transition to net-zero-carbon transport. In addition, the Transport Research and Education Network was launched to bridge the gap between the scientific community and national Governments.

C. Building low-carbon industries

The industrial sector, especially manufacturing and construction, is the largest greenhouse gas emitter in the region if emissions are attributed based on where energy is consumed. The region accounts for nearly three quarters of global emissions in manufacturing and construction, reflecting its central role in global value chains. Climate-smart trade and investment can accelerate the transition of energy-intensive industries and energy-intensive processes in manufacturing and construction to a low-carbon future. Within a global rules-based framework, international trade and investment can support this transition, including through the dissemination of technologies to make production less carbon intensive.

In recent years, the gap between consumption- and production-related emissions has widened internationally. Carbon leakage - production displaced from countries with stringent environmental policies to countries with more lenient requirements - is occurring from the rest of the world to Asia and the Pacific. This is leading some major trading partners, such as the European Union, to introduce carbon border adjustment taxes, which is expected to influence future production practices and trade flows.

Eliminating fossil fuel subsidies and establishing carbon pricing mechanisms internalize the environmental costs of greenhouse gas emissions and disincentivize carbon leakage. This must be complemented by introducing lesser-emitting production technologies and removing barriers to trade in environmental goods, including vital climate action technologies, such as solar panels and wind turbines. Many countries have set mandatory emission standards for imported vehicles, require energy ratings labels and certification for sourcing legal and sustainable timber, and have banned trade in chlorofluorocarbons - the gaseous compounds most to blame for stratospheric ozone depletion. Such non-tariff measures should be built on, supplemented by eco-labelling.

It is crucial to integrate climate considerations into regional trade agreements. These considerations can incorporate precise, replicable and enforceable environment- and climate-related provisions to ensure that trade is climate smart. Eighty-five per cent of the regional trade agreements signed since 2005 to which at least one Asia-Pacific economy is party contain climate-related provisions. These measures have promoted trade in environmental goods, services and technologies and have not been detrimental to developing country exports. Expanding regional trade agreements to include a maximum amount of goods with climate benefits could unlock further benefits. Binding commitments to guard against fossil fuel subsidies must be included.

Although climate-smart foreign direct investment (FDI) can help to combat climate change, such investment in climate mitigation and adaptation has been unevenly distributed across the region. Developed countries and large developing countries in the region have been the principal destinations of FDI. Least developed countries and small island developing States have received no climate-related FDI since 2011. Investment promotion agencies of least developed countries and small island developing States need support in attracting and facilitating climate-related FDI. Tailored indicators are needed to assess, evaluate and measure the climate-relevant characteristics of investments.

Setting industries on a low-carbon pathway cannot be achieved without the active involvement of the private sector or without embedding sustainability into business operations. The number of companies issuing sustainability reports and accounting for greenhouse gas emissions has dramatically increased in recent years. Some have introduced an internal carbon price as a tool to reduce dependency on fossil fuels. An increase in internal carbon pricing has occurred in companies over the past few years, with 796 Asian companies using or planning to use an internal carbon price, according to CDP Worldwide.⁸ Opportunities for the private sector include increasing resource productivity, retaining budgets to invest in low-carbon technologies and incorporating carbon costs into procurement and investment decisions.

III. Financing climate action and measuring progress

A. Financing the transition to net zero

Finance is the enabling factor that allows policymakers to implement climate action. A bold financing programme could increase the resilience of developing countries in Asia and the Pacific to climate-related disasters and repair the damage done to the natural environment and biodiversity. To this end, the considerable scaling up of financing and the reprioritization of scarce capital are needed in the context of depleted fiscal space, rising debt vulnerabilities, high inflationary pressure and tighter financial conditions.

The climate action financing needs in Asia and the Pacific are sizeable. A rudimentary estimate suggests that the annual average financial needs to meet the nationally determined contributions in selected developing countries in Asia and the Pacific are about \$362 billion per year, consisting of \$258 billion for mitigation and \$104 billion for adaptation.⁹ Current financial flows fall well short of this amount. The success of new sustainable financial instruments, such as green and sustainability-linked bonds, which channel capital to support climate action, is encouraging, as are the green norms increasingly adopted by banks and investors in response to climate-related regulations. A whole-of-government approach at the national level and concerted regional action are needed to deliver adequate financing for climate action.

Coherent national financing policies are required across different sectors of the economy to develop environmental standards, incentivize the energy transition and encourage the adoption of green technologies. A greater level of convergence is needed between countries' private and financial-sector applications of climate standards, while opportunities for regional harmonization and the cross-listing of both debt and equity instruments should be explored. Domestic collaboration between private financial institutions and project developers must be encouraged in the pre-investment phase to jointly develop investment-ready projects supporting the energy transition.

The banking sector, capital markets and their regulators need to integrate climate science, carbon disclosure, and environmental, social and governance standards into lending and investing practices. For most least developed countries and small island developing States, the commercial banking sector is likely to remain the main tool for financial intermediation. Reducing the cost of capital for banks embracing sustainable finance should, therefore, be considered by regulators. Multilateral development banks and bilateral development finance institutions also have a critical role in mobilizing finance in countries with underdeveloped capital markets. The concessional credit they can provide to national private or public finance institutions should be linked to sustainable finance.

National public and private financial institutions need to be incentivized to support research and development in new green technologies and make the uptake of such technologies less risky. Regional cooperation in developing coherent standards, reporting frameworks and policy environments to scale up climate finance and to use innovative financing instruments is urgently needed in order to redirect capital towards climate action. This would help Governments to assess climate risks adequately and to ensure that financing and projects are priced appropriately and comply with international capital regulations and sustainability principles.

The creation of a regional fund that defrays the costs of member States to prepare low-carbon-transition or energy-transition projects for private financing is necessary, particularly for smaller projects. This is important given the challenges faced by many member States in gaining access to global climate funds. Smaller projects need to be proven and then scaled up to attract more financing. This must be recognized as a major hurdle to attracting climate financing at the necessary scale.

B. Measuring challenges and progress

The identification of climate challenges and the undertaking of effective climate actions by national, regional and global stakeholders must be underpinned with internationally comparable climate-related information and data. This includes data on the drivers of climate change, on its impacts and on the vulnerabilities it creates, as well as data on mitigation and adaptation efforts and the implementation of commitments. Effective multilateral climate action requires evidence that is internationally consistent to support informed negotiations, investments and interventions. Only reliable, comparable data can shape effective action to reverse the climate crisis and enable progress to be tracked.

Relevant data, statistics and indicators are collected and held by various government agencies and scientific and research institutions, which often use different approaches to data production. This fragmentation makes it challenging to provide coherent evidence as the basis for national climate decisions or internationally comparable information to inform multilateral climate negotiations and action. The production and policy use of climate change-related information will greatly benefit from internationally agreed concepts and frameworks. To date, the flexibility in international reporting

requirements under the Paris Agreement has posed a challenge to global data comparability and aggregation, which is necessary to track progress in climate action.

A unified reporting system for developed and developing countries will be put in place from 2024 to support greater consistency in data and statistics. New biennial transparency reports will be required under the enhanced transparency framework for action and support – established for reporting and review under the Paris Agreement – to ensure the transparency of mitigation and adaptation actions and related support. The Global Set of Climate Change Statistics and Indicators was adopted by the Statistical Commission in March 2022 to assist countries in preparing national sets of climate change statistics and indicators according to their individual concerns, priorities and resources. Compliance with the enhanced transparency framework and the Global Set of Climate Change Statistics and Indicators is critical, as is the greater involvement of national statistical offices in the data submissions required by international frameworks.

As data inform progress towards national and international climate commitments, data investment decisions should be made with consideration for the cross-cutting and interlinked nature of climate change-related data within entire national data ecosystems. A system-wide inter-institutional approach to improving the capacity of national statistical systems, with national statistical offices playing a driving role, should be considered. This is important in the context of the midterm review of the Sustainable Development Goals in 2023. In Asia and the Pacific, there are insufficient data on one quarter of the indicators to monitor progress on climate change-related Goals and targets. Such data gaps undermine successful interventions in the areas of climate change impacts and adaptation.

Fundamentally, there is an urgent need to invest in and strengthen statistical capacity. National statistical offices and policy communities should join forces to agree on data priorities and implement plans informed by climate-related commitments. They should set the course to improve climate-change data ecosystems, multi-stakeholder engagement and climate data governance. Existing data and knowledge can be maximized to inform climate action by using new data technologies in line with internationally recognized statistical frameworks and guidelines.

IV. Enhancing regional cooperation for faster, more effective action

Low-carbon and resilient development requires cooperation between countries to support policy frameworks for economy-wide emission reductions. To set major sectors on a low-carbon pathway, boost climate financing to the required scale and improve monitoring, the secretariat recommends strengthening regional cooperation by:

- a** Promoting regional cross-border electricity grids to scale up the share of renewable energy. Efforts should be focused at the subregional level through a regional green power corridor framework where a set of scenarios could be developed for the increased deployment of renewable energy through a cross-border power system and a set of principles to align power system connectivity with national sustainable development and climate action goals;
- b** Promoting the transition to low-carbon mobility and logistics through the exchange of best practices and information facilitated by the regional cooperation mechanism on low-carbon transport and the Asia-Pacific initiative on electric mobility;

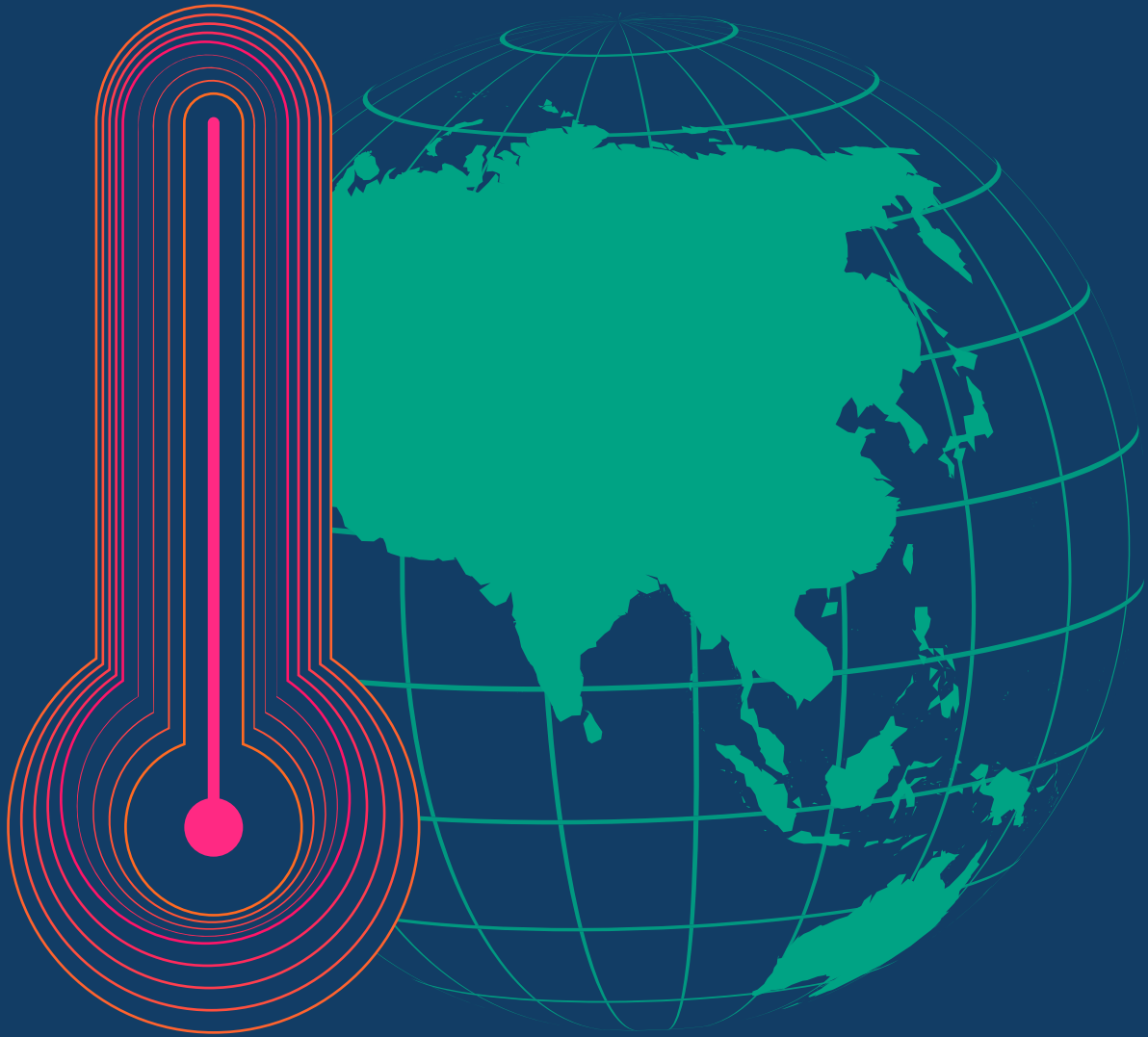
- c** Supporting the transition of manufacturing industries to a low-carbon future by promoting climate-smart trade policies, such as including climate-related provisions in regional trade agreements, and advancing non-tariff measures and national capacities to implement climate-smart investment;
- d** Promoting regional cooperation to develop coherent standards and disclosure requirements to scale up climate finance. This is needed to support the energy transition, redirect capital to climate action and disseminate best practices on how to best mobilize private finance;
- e** Promoting cooperation for strengthening national capacity to monitor climate change impacts, adaptation and mitigation actions, following the operationalization of the enhanced transparency framework under the Paris Agreement and the adoption of the Global Set of Climate Change Statistics and Indicators;
- f** Developing a regional platform and partnership on the low-carbon and climate-resilient transition to support national processes on long-term low-emissions development strategies and nationally determined contributions, as well as sectoral policies. This platform would be open to governments and other stakeholders, including the private sector. It would facilitate policy dialogue, technical cooperation, and technology and knowledge transfer, with a particular focus on multisectoral initiatives on energy, transport and industry.

The race to achieve net-zero emissions is on. A resilient and sustainable future depends on regional resolve. Now is the time to step up regional collaboration in Asia and the Pacific and join forces to accelerate climate action to keep global warming within 1.5°C.

ENDNOTES

- 1 Asia-Pacific Risk and Resilience Portal. Available at <https://rrp.unescap.org/>.
- 2 See <https://edgar.jrc.ec.europa.eu/>.
- 3 World Energy Statistics and Balances database. Available at www.iea.org/data-and-statistics/data-product/world-energy-statistics-balances (accessed on 5 December 2022).
- 4 See [https://asiapacificenergy.org/apef/index.html#main/lang/en/graph/10/type/O/sort/O/time/\[min,max\]/indicator/\[2872:58861/geo/\[ASPA,WORLD,AFRICA,EURO,LAAC,NOAM,OTCA/legend/1/inspect/O](https://asiapacificenergy.org/apef/index.html#main/lang/en/graph/10/type/O/sort/O/time/[min,max]/indicator/[2872:58861/geo/[ASPA,WORLD,AFRICA,EURO,LAAC,NOAM,OTCA/legend/1/inspect/O).
- 5 *ITF Transport Outlook 2021* (Paris, Organisation for Economic Co-operation and Development Publishing, 2021).
- 6 Association of Southeast Asian Nations (Jakarta, 2019).
- 7 *Global EV Outlook 2022: Securing Supplies for an Electric Future* (2022).
- 8 *Putting a Price on Carbon: the State of Internal Carbon Pricing by Corporates Globally* (2021).
- 9 Calculation based on data from the Nationally Determined Contributions database of the Institute for Global Environmental Strategies, version 7.7. Available at www.iges.or.jp/en/pub/iges-inde-nde-database/en (accessed on 21 October 2022).

PART I



RESPONDING TO A CLIMATE EMERGENCY

CHAPTER 1

CLIMATE CRISIS IN ASIA AND THE PACIFIC

Asia and the Pacific has joined the race to net zero under challenging circumstances. The COVID-19 pandemic triggered an unprecedented global economic crisis, upended lives and livelihoods, and pushed 85 million people in the region into extreme poverty. The crisis in Ukraine has disrupted global supply chains and created inflationary pressures and a great deal of uncertainty. Most countries have experienced high volatility in commodity and food prices, often linked to the depreciation of their currencies against the United States dollar. Many developing countries face worsening financial conditions and increasingly limited fiscal space. Increased frequency of and intense climate-induced extreme weather events, which have a disproportionate impact on the health and well-being of poor and vulnerable groups, compound the region's challenges.

The region is at a critical juncture; even though policy focus is understandably on recovering from the impacts of multiple overlapping crises, the need for climate action cannot be postponed. Recovery efforts must be integrated into action supporting the adoption of low-carbon, resilient and inclusive development pathways. Recent efforts to confront the COVID-19 pandemic have shown the ability of governments in Asia and the Pacific to act quickly and decisively. The same spirit is required to reduce carbon emissions, conserve natural resources and tackle inequities within and across countries. Achieving the global goal of limiting global warming to 1.5°C depends on the region's resolve and countries' commitment to honour their pledges to achieve carbon neutrality – net-zero emissions – by 2050. The race to net zero is on.

A vulnerable region

Nowhere is the need to enhance climate action more apparent than in Asia and the Pacific. Over the past sixty years, warming in the region has exceeded the global mean. The increased variability of weather, rising temperatures, and frequent and intense disasters have led to tragic loss of life, displaced communities and adversely affected people's health.¹ Food systems have been endangered, ecosystems have been destroyed and economies and societies have been undermined. Between 2000 and 2019, 8 out of the top 10 countries most affected by disasters were in Asia and the Pacific. Under all forecast scenarios, the region will remain the most affected by heavy rainfall, drought, heatwaves and intensifying tropical cyclones. The ever-increasing costs of climate change are exacerbating poverty and jeopardizing sustainable development.

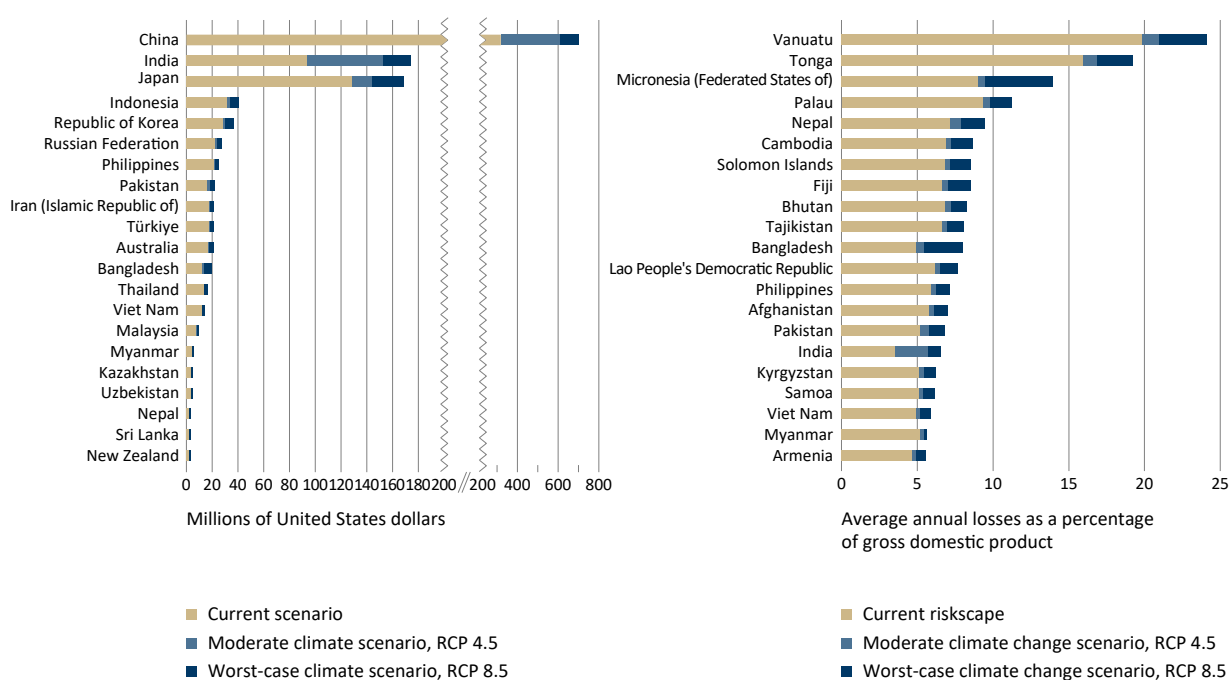
The environmental impacts of climate change in Asia and the Pacific are alarming. Over the past 40 years, significant mass losses have been recorded in five glaciers in the High-Mountain region in East and North-East Asia and South Asia. This trend has accelerated in the twenty-first century. Glaciers in this area cover approximately 100,000 km² and contain the largest volume of ice outside the polar region. Their retreat imperils the freshwater supplies of the most densely populated part of the planet. The global average sea level continues to rise. In the Indian Ocean and parts of the Pacific Ocean, including the western tropical Pacific, slightly more rapid rates of sea-level change than the global mean of 3.3 mm per year have been recorded, with existential implications for the future of small islands States.³

Most countries are still ill-prepared for multiple overlapping crises. The increasing risks, which have been continuously hitting the Asia-Pacific region, are posing a serious challenge to adaptation planning

and climate-resilient development. Climate change and climate-induced disasters are increasingly threatening development in Asia and the Pacific, often undermining hard-won development gains and exacerbating the underlying drivers of poverty and societal inequalities by disproportionately burdening poor and marginalized groups. These include women and children, older persons, persons with disabilities, migrants, indigenous populations and young people in vulnerable situations.

The costs of climate change are already too high. According to the Economic and Social Commission for Asia and the Pacific (ESCAP)⁴ estimates of annual average losses resulting from natural and biological hazards in Asia and the Pacific are approximately \$780 billion. Under a moderate climate change scenario (Representative Concentration Pathways, RCP 4.5), these losses are expected to increase to \$1.1 trillion, and under the worst-case scenario (RCP 8.5) to \$1.4 trillion.⁵

Figure 1.1. Average annual losses due to natural and biological hazards



Source: *Resilience in a Riskier World: Managing Systemic Risks from Biological and Other Natural Hazards. Asia-Pacific Disaster Report 2021* (United Nations publication, 2021).

In 2021 alone, more than 100 natural hazards - floods, tropical cyclones, heatwaves and droughts - killed 4,000 people and disrupted the lives of 48.3 million people in Asia. The cost of the damage was estimated at \$35.6 billion. The greatest losses were caused by flooding, such as what occurred in India, which led to losses equivalent to \$3.1 billion from infrastructure and agricultural damage. Flooding in Pakistan led to losses equivalent to 2.2 per cent of gross domestic product (GDP), affected 33 million people, displaced 8 million people and pushed almost 9 million people into poverty. Compared to the past 20-year average for economic losses caused by disasters in Asia, in 2021, economic damage from drought increased by 63 per cent, from flooding by 23 per cent, and from landslides by 147 per cent.⁶

As a share of GDP, ESCAP forecasts the Pacific small island developing States and other lesser developed countries will be the worst hit economically. The Pacific small island developing States, ecologically fragile countries heavily burdened by natural and biological hazards, are expected to face some of

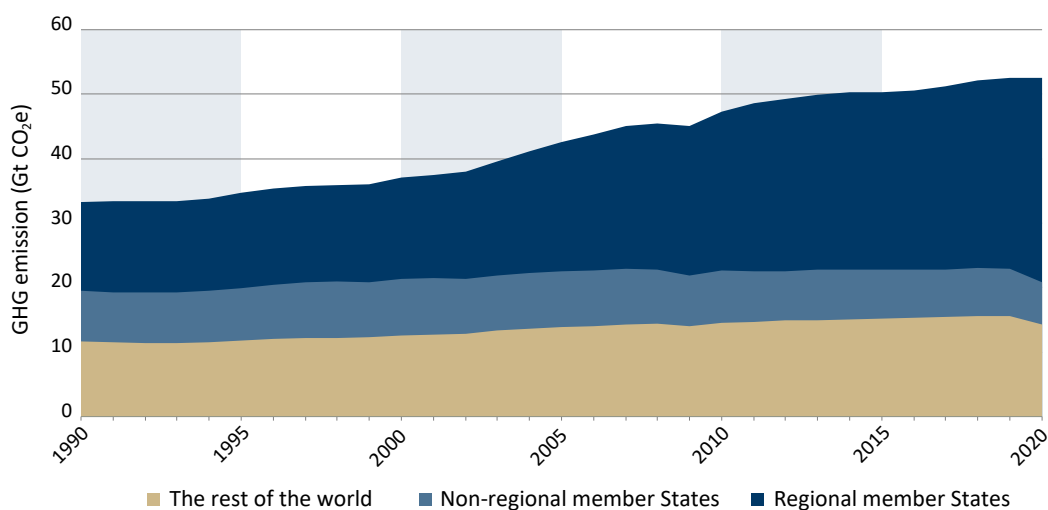
the worst climate change outcomes. Natural hazards lead to an increase in vector-borne diseases, such as malaria or dengue, heatwave-related strokes and malnutrition. These conditions are increasing with climate change and call for stronger integration of health and disaster risk reduction management systems.⁷ China, India, Japan, Indonesia, the Republic of Korea and the Russian Federation are projected to suffer the greatest losses in absolute terms under the worst-case climate scenario.

Climate change is making the inhabitants of the region’s rapidly growing cities increasingly vulnerable. Building materials that retain heat combined with the loss of green spaces contribute to an urban heat island effect. Slums and informal settlements with improvised housing can form microheat islands. Many regions are experiencing higher temperatures and different patterns of rainfall, and those along the coasts are threatened by rising sea levels and extreme weather events. Heatwaves are an intensifying hazard that has only recently begun to attract the policy attention it deserves. The people hit hardest by them usually live in poor-quality housing on marginal land.

Rising greenhouse gas emissions

Asia and the Pacific emits more than half of global greenhouse gas emissions. The region’s share continues to increase as countries continue to power their development with fossil fuels. Its greenhouse gas emissions have more than doubled between 1990 and 2020.

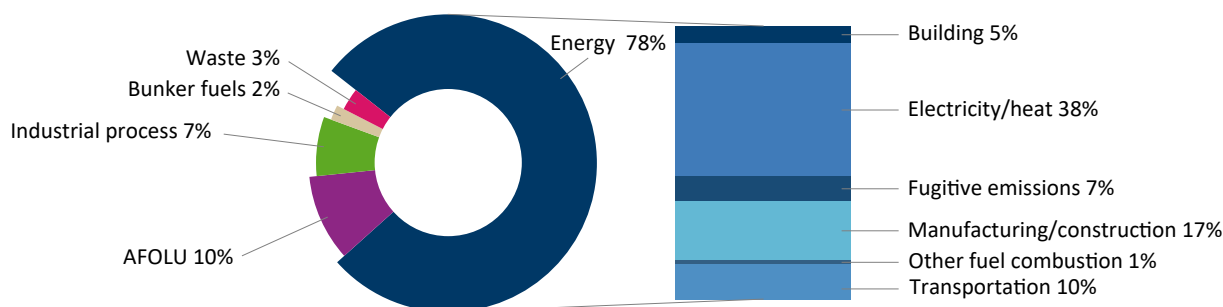
Figure 1.2. Greenhouse gas emissions trends in the Asia-Pacific region compared to the rest of the world, 1990–2020 (GtCO₂e)



Sources: Intergovernmental Panel on Climate Change, *AR6 Synthesis Report: Climate Change 2023* (2022). Available at www.ipcc.ch/report/sixth-assessment-report-cycle/; and European Commission, “Historical emissions data”, Emissions Database for Global Atmospheric Research. Available at <https://zenodo.org/record/5566761#.ZABspXZBzIW>.

The major sources of greenhouse gas emissions in the Asia-Pacific region are electricity and heating, manufacturing and construction, and transportation (figure 1.3). Electricity and heating account for the bulk of energy emissions, 38 per cent of total emissions, which is higher than emissions from electricity and heating in the rest of the world. The share of emissions from manufacturing and construction in the region is double that of the rest of the world. Heavy industries, such as steel and cement production, account for more than 50 per cent of all industrial emissions globally and 70 per cent of global steel production takes place in Asia. The Asia-Pacific region produces 73 per cent of the cement output globally and consumes 81 per cent of it. The transport sector is the third major source of energy-related carbon dioxide (CO₂) emissions in Asia and the Pacific. These emissions have increased by 40 per cent during the past decade.

Figure 1.3. Greenhouse gas emissions in the Asia-Pacific region by sectors, 2020

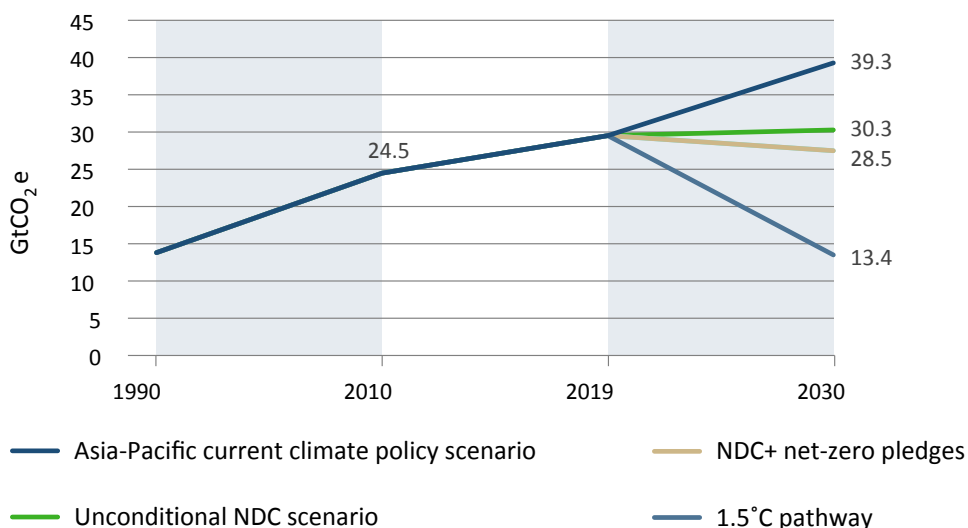


Sources: Intergovernmental Panel on Climate Change, *AR6 Synthesis Report: Climate Change 2023* (2022) (See chap. 1, figure 1.2).

To keep the world well below a 2°C temperature rise and within the 1.5°C temperature rise in accordance with the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, the International Panel on Climate Change (IPCC) has called for a global greenhouse gas emissions reduction of 45 per cent by 2030 compared to 2010 levels. The region’s contribution to such a greenhouse gas emissions reduction is critical to achieving carbon neutrality by the period 2050–2060 and maintaining a global 1.5°C development pathway.

Countries in Asia and the Pacific collectively emitted 31.6 GtCO₂e in 2020. Current nationally determined contributions (NDCs) commitments for greenhouse gas emission reduction and regional greenhouse emissions trajectories are projected to result in greenhouse gas emissions of 28.5 GtCO₂e in 2030. As shown in figure 1.4, this represents a 16 per cent increase from 2010 levels, rather than the 45 per cent reduction required to achieve the 1.5°C pathway.⁸ The current gap in the regional NDC commitments needs to be addressed at the national level to avoid a large overshoot. Collective efforts are required to spur the region’s mitigation ambition and support the mid-century climate neutrality trajectory that would keep the region within the 1.5°C target.

Figure 1.4. Greenhouse gas emissions scenarios with compounded nationally determined contribution and carbon neutral pledges for the Asia-Pacific region, 1990–2030



Sources: Intergovernmental Panel on Climate Change, *AR6 Synthesis Report: Climate Change 2023* (2022) (see chap. 1, figure 1.2).

A low-carbon pathway

In 2022, the number of Asia-Pacific member States making carbon neutrality pledges rose to 39. Commitments vary from achieving carbon neutrality or net-zero CO₂, to net-zero greenhouse gas emissions by mid-century.

Thirty-nine member States have committed to carbon neutrality and net zero between 2050 and 2060. To support their carbon neutrality goals, most countries plan to use nature-based solutions (NbS), which aim to protect, manage and restore ecosystems to increase carbon storage and avoid greenhouse gas emissions. Forty-three of the 49 countries in the region have mitigation commitments referencing NbS and most also reference NbS investment to underpin climate adaptation. Twenty-one countries have quantified NbS-related baseline emissions, but only 14 countries have gone further to quantify targets for emissions reduced via NbS.

Table 1.1. Nature-based solutions-related targets in low-emissions development strategies

| Countries | Nature-based solutions related targets and/or commitments |
|-------------|--|
| Australia | Increase 63 MtCO ₂ e of accredited carbon offsets each year by 2050, involving 1.5 million hectares of on-farm plantings (equivalent to 2 per cent of total agricultural land) |
| China | Increase forest coverage rate to 25 per cent by 2030, and increase forest stock volume by 6 billion cubic meters over 2005 level |
| Cambodia | Achieve carbon neutrality in 2050 with the forest and other land use (FOLU) sector providing a total carbon sink of 50 MtCO ₂ e |
| Fiji | Increase the total area of mangroves to a maximum level of 54,762 hectares and a maximum sequestration of 531,204 tCO ₂ e in 2050 |
| India | Create an additional carbon sink of 2.5 to 3 GtCO ₂ e through additional forest and tree cover by 2030, including restore 26 million hectares of deforested and degraded land by 2030 |
| Indonesia | Reach the peaking of national greenhouse gas emissions in 2030 with net sink of forest and land-use sector reaching 540 MtCO ₂ e by 2050 |
| Nepal | Pave the way to net-zero emissions by 2045, with carbon sequestration potential reaching 5.7 MtCO ₂ e in 2050 |
| New Zealand | Increase new forest area with more than 1.2 million hectares from 2022 to 2050 |
| Thailand | Increase forest and green areas by up to 55 per cent of the country's total land area to achieve net-zero emission in 2065, with the carbon sequestration of 120 MtCO ₂ e |
| Tonga | Protect all (100 per cent) of intact mangrove forests and other coastal vegetation |

Source: United Nations Climate Change Long-term Strategies portal. Available at <https://unfccc.int/process/the-paris-agreement/long-term-strategies>.

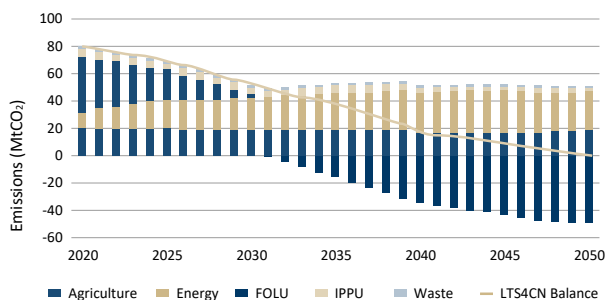
Carbon neutrality pledges need to be aligned with updated and sufficiently ambitious NDC targets. The NDC Partnership has recently launched a thematic call on long-term low-emissions development strategies (LT-LEDS) and NDC alignment, update and enhancement, which aims to help developing countries narrow this gap. Many developing countries in the region are embarking on developing LT-LEDS to achieve their carbon neutrality and net-zero commitment as shown in table 1.2. However, only 15 Asia-Pacific countries have submitted LT-LEDS as of early 2023, while the 21st Conference of Parties in 2015 put 2020 as the submission timeline in accordance with Article 4 of the Paris Agreement.⁹ Those LT-LEDS should also be updated to support national carbon neutrality pledges.¹⁰

Table 1.2. Implementing carbon neutrality pledges in the Asia-Pacific Region

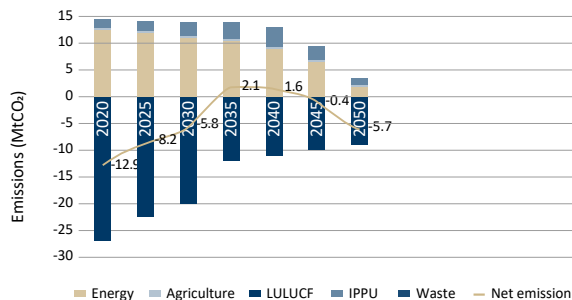
| Achieved | Adopted a law | Policy document | | Declaration/pledge | |
|----------|-------------------|-----------------|----------------------------------|----------------------------------|--------------------|
| Bhutan | Australia | China | Cambodia | Afghanistan | Pakistan |
| | Fiji | Kazakhstan | Indonesia | Armenia | Palau |
| | Japan | Malaysia | Lao People's Democratic Republic | Brunei Darussalam | Papua New Guinea |
| | Maldives | Nauru | Marshall Islands | Kyrgyzstan | Russian Federation |
| | New Zealand | Singapore | Nepal | Kiribati | Samoa |
| | Republic of Korea | Sri Lanka | Solomon Islands | India | Tonga |
| | | Uzbekistan | Thailand | Micronesia (Federated States of) | Türkiye |
| | | | Viet Nam | Myanmar | Tuvalu |
| | | | | | Vanuatu |

Figure 1.5. Long-term low-emission development strategies of Asia-Pacific countries

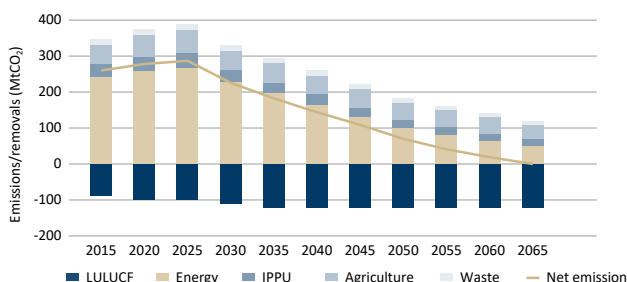
Cambodia



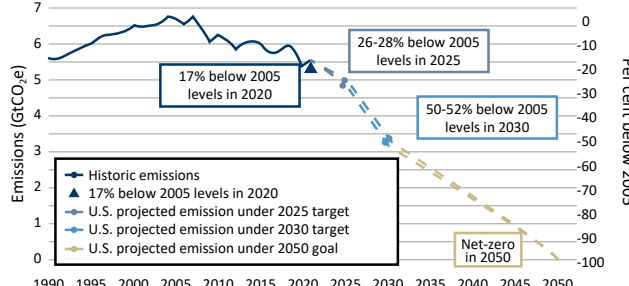
Nepal



Thailand



United States



Source: United Nations Climate Change Long-term Strategies portal (see chap. 1, table 1.1).

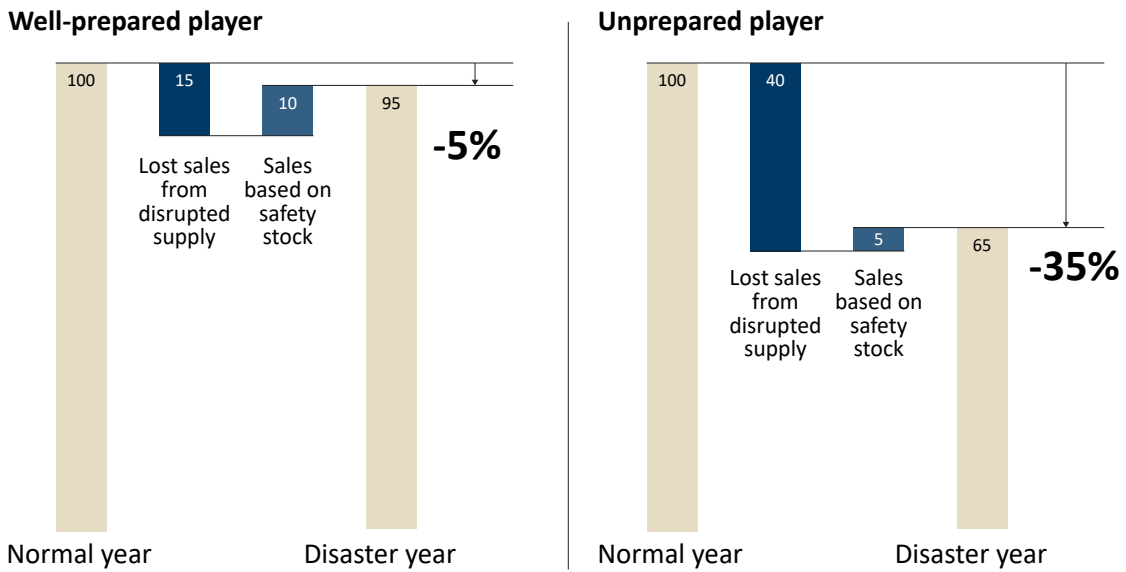
Notes: FOLU, forest and other land use; IPPU, industrial product and processes use; LTS4CN, long-term standing strategy for carbon neutrality; LULUCF, land use, land use change and forestry.

Adaptation and early warning systems

National adaptation plans (NAPs) to reduce vulnerability to the impacts of climate change are crucial. They facilitate the integration of climate change adaptation into relevant policies, programmes and activities, and identify what is needed to shield sustainable development from the threats posed by climate change and climate-induced disasters. Many countries have yet to develop fully fledged NAPs.

Clear adaptation strategies are particularly important in key sectors. In the energy sector, extreme weather events and natural disasters have led to the destruction of infrastructure and the interruption of services. In the transport sector, a climate risk assessment analysis needs to be integrated into planning and infrastructure design, and prioritize adaptation efforts. Countries are experiencing increasing disruptions in the global supply chains as extreme weather events interrupt production and lead to higher prices. Sectoral mitigations plans are needed to increase the resilience of global supply chains in the face of climate impacts.

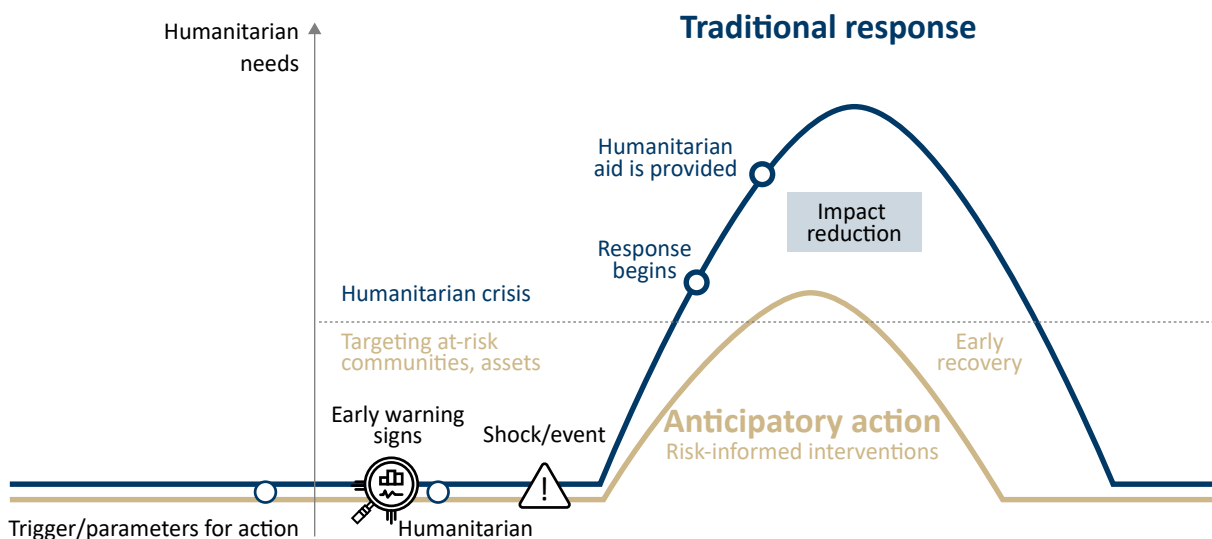
Figure 1.6. Effects of 100-year hurricane on downstream electric player



Source: Jonathan Woetzel and others, “Could climate become the weak link in your supply chain?”, case study, 6 August 2020 (McKinsey Global Institute).

The Global Commission on Adaptation has highlighted that investing in early warning systems delivers a very high return on investment.¹¹ Strengthening multi-hazard early warning systems can unlock multiple benefits across sectors. The experience of Bangladesh is noteworthy: cyclone-related mortality has declined by more than one hundredfold over the past 40 years, from 500,000 deaths in 1970 to 4,234 in 2007. The decrease is directly attributable to early warning systems.¹² Yet despite demonstrable benefits, few countries have multi-hazard early warning systems anchored in the national legislation and emergency response regulatory frameworks, which are essential for them to be effective. Fourteen per cent of countries in Asia and 26 per cent of countries in the Pacific have no frameworks whatsoever.^{13, 14, 15}

Figure 1.7. Tackling the extent of humanitarian crisis by anticipatory action



Source: World Meteorological Organization, *State of the Climate in South-West Pacific 2021* (Geneva, 2022).

The COP27 called for “early warning for all” needs to be operationalized as the key adaptation priority in the Asia-Pacific region. The increasing losses under the worst-case climate change scenario far outweigh the cost of investing in strengthening early warning systems¹⁶ across the region. In South and South-West Asia, the annual average losses are estimated at 7 per cent of GDP, whereas investing in early warning systems would cost approximately 0.24 per cent of GDP. In the light of these benefits, the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness has invested in strengthening multi-hazard early warning systems for all people (box 1.1). Effective early warning systems play a pivotal role in avoiding a humanitarian crisis and building resilience by enabling anticipatory action and reducing the hazard. Investing in this adaptation measure will protect lives, livelihoods and development gains.

Box 1.1. ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness: prioritizing early warning for all

Strengthening multi-hazard early warning systems for all people, with a focus on the communities most at risk, is a key strategic pillar of the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness. Out of \$16 million invested, 44 per cent has been dedicated to early warning systems; 25 per cent to communication; 19 per cent to risk knowledge and 12 per cent to response and common alert protocols.

The Trust Fund has promoted innovative pilot initiatives, scaled up successful early warning systems and facilitated regional cooperation, directly benefiting 20 countries, most of which are least developed countries and small island developing States. It has supported the following:

- **Establishment of the Regional Integrated Multi-hazard Early Warning System for Africa and Asia (RIMES)** in 2009. This system is enhancing the forecasting, communication, risk assessment, and preparedness capacities of 48 countries.
- **The Indian Ocean Tsunami Warning System** with services provided by Australia, India and Indonesia to cover low-capacity countries since 2011. This includes a unified approach across the **Northwest-Indian Ocean countries** where the risk of a field tsunami is high. It is estimated that this service alone will save 1,000 lives per year over the next 100 years.
- More and more countries regularly meet in **multisectoral national “monsoon forums” and subregional “climate outlook forums”**, especially least developed countries and small island developing States. These forums have been instrumental in developing a culture of preparedness and have contributed to protecting livelihoods and mitigating damages to critical infrastructure, such as energy and water.

Source: ESCAP, “Early warning for all: saving lives in Asia and the Pacific”, 12 October 2022. Available at www.unescap.org/blog/early-warning-all-saving-lives-asia-and-pacific.

Protecting the most vulnerable

Women are particularly vulnerable to the impacts of climate change. When gender intersects with race, ethnicity, indigenous status, age, disability or socioeconomic status, the impact of climate change on women’s economic empowerment prospects can be extremely negative.¹⁷ For instance, indigenous peoples, who are among the poorest groups, tend to live in geographical regions that are at higher risk of climate variabilities and extreme weather conditions. At the same time, climate change has a particular impact on work traditionally carried out by women, such as agricultural activities,¹⁸ and unpaid care and domestic work. Women from indigenous peoples are consequently more likely than men to face water and land insecurity, which increases their workload in securing food and the time they spend in unpaid care and domestic work.¹⁹

Eighty per cent of people displaced by climate change are women.²⁰ Before the COVID-19 pandemic, projections suggested that by 2030, only 15.8 per cent of the world's poor women and girls would be living in South Asia. Revised projections put that figure at 18.6 per cent.²¹ When disasters strike, women are less likely to survive and more likely to be injured due to long-standing gender inequalities in access to technology and information, mobility and decision-making, as well as access to resources and training.²² Girls are more likely than boys to be pulled out of school to help with care and domestic work in the aftermath of disasters, which is a barrier to achieving universal primary education.²³ Furthermore, women and girls are less able to access relief and assistance.²⁴

Women are underrepresented in environmental decision-making and overrepresented in industries most affected by changing climate.²⁵ Their contribution is needed to understand better the link between climate change, women's empowerment and development, and to shape effective mitigation and adaptations policies. It is essential to address the underlying causes of inequality, poverty, hunger, underemployment and ill health. Forward-looking climate action goals must consider their impacts on women and men and the ways in which both can contribute towards adaptation and mitigation. A stand-alone goal that addresses why women are more vulnerable to climate change could help empower women to participate in adaptation and risk reduction efforts. Gender and climate change considerations must also be integrated into other goals.²⁶

Older persons are another group disproportionately affected by climate change. Those with disabilities are at a particular risk due to reduced mobility. Yet persons with disabilities are rarely included in decision-making and planning for extreme weather events.²⁷ The existing early warning or evacuation systems do not always reflect disability-related needs. Tragically, in climate-related emergencies, older women can be seen as a burden, making them more vulnerable to abuse and neglect.²⁸ Changing climate, biodiversity loss and environmental degradation are particularly acute for the most vulnerable workers, including rural workers and workers from lower-income countries and small-island developing States.²⁹ These phenomena disproportionately affect those living in poverty and can exacerbate economic, gender and other social inequalities.³⁰

Climate change and environmental degradation pose a threat to children and young people.³¹ Children's biological development stages are threatened by a high level of pollution, which their bodies cannot regulate the same way as adults. Their nutrients are adversely affected by disasters that disrupt food security. Children aged 10 years or younger in 2020 are projected by 2100 to experience a nearly fourfold increase in extreme events under 1.5°C of global warming and a fivefold increase under 3°C warming.³² According to the UNICEF Children's Climate Risk Index (CCRI), which ranks countries based on children's exposure to climate and environmental shocks, only Australia and Brunei Darussalam have a low index score in Asia and the Pacific.³³ For other countries in the region, a medium to extremely high index score had been recorded, reflecting their vulnerability to climate impacts.

Governments have a duty to young people and future generations. They are responsible for creating an enabling environment for intergenerational approaches to solving the climate crisis.³⁴ Reframing adolescents as partners would help harness their knowledge, experiences and views for more effective sustainable services, policies and practices.³⁵ The Action for Climate Empowerment (ACE) is a term adopted by UNFCCC, which focuses on six elements: climate education; public awareness; training of, for example, scientific, technical and managerial personnel; public participation; access to information; and international cooperation on these issues. ACE aims to help prepare for the challenges that climate change brings and empower stakeholders to respond accordingly.³⁶

ENDNOTES

- 1 World Meteorological Organization (WMO), *State of the Climate in Asia 2021* (Geneva, 2022).
- 2 United Nations Office for Disaster Risk Reduction and Centre for Research on the Epidemiology of Disasters, Human cost of disasters: an overview of the last 20 years (2000-2019). Available at www.undrr.org/media/48008/download. China, India, the Philippines, Indonesia, Japan, Viet Nam, Bangladesh and Afghanistan are among the top 10 countries in terms of disaster occurrence, while in terms of population affected, China, India, the Philippines, Bangladesh, Thailand, Pakistan and Viet Nam are among the 10 top countries.
- 3 WMO, *State of the Climate in Asia 2021* (see chap. 1, footnote 1).
- 4 United Nations, Economic and Social Commission for Asia and the Pacific, Asia Pacific Risk & Resilience Portal. Available at rrp.unescap.org.
- 5 *Resilience in a Riskier World: Managing Systemic Risks from Biological and Other Natural Hazards Asia Pacific Disaster Report 2021* (United Nations publication, 2021).
- 6 Ibid.
- 7 United Nations, Economic and Social Commission for Asia and the Pacific and others, “Pathways to manage cascading risks and protect people in South Asia: key takeaways for stakeholders”, Asia Pacific Disaster Resilience Network policy study (5/2020).
- 8 United Nations Framework Convention on Climate Change, document FCCC/PA/CMA/2022/4.
- 9 The 15 member States that have submitted their LT-LEDS are Australia, Cambodia, China, Fiji, India, Indonesia, Japan, the Marshall Islands, Nepal, New Zealand, the Republic of Korea, the Russian Federation, Singapore, Thailand and Tonga.
- 10 The member States that are currently developing LT-LEDS are Kazakhstan and Viet Nam.
- 11 Global Commission on Adaptation, “Adapt now: a global call for leadership on climate resilience”, 13 September 2019. Available at <https://gca.org/reports/adapt-now-a-global-call-for-leadership-on-climate-resilience/>.
- 12 Ubydul Haque and others, “Reduced death rates from cyclones in Bangladesh: what more needs to be done?”, *Bulletin of the World Health Organization*, vol. 90, No. 2 (February 2012), pp. 150-156.
- 13 *2022 Review of Climate Ambition in Asia and the Pacific: Raising NDC Targets with Enhanced Nature-based Solutions with a Special Feature on Engagement of Children and Youth in Raising National Climate Ambition* (United Nations publication, 2022).
- 14 UN Women Fiji Multi-Country Office, “Why is climate change a gender issue?” (2014). Available at www.unclearn.org/wpcontent/uploads/library/unwomen704.pdf.
- 15 International Energy Agency, *World Energy Outlook 2020* (Paris, 2020).
- 16 United Nations, Economic and Social Commission for Asia and the Pacific, Asia Pacific Risk & Resilience Portal. Available at rrp.unescap.org.
- 17 International Labour Organization, *World Employment and Social Outlook: Trends for Women 2017* (Geneva, 2017).
- 18 Ibid.
- 19 *COVID-19 and the Unpaid Care Economy in Asia and the Pacific* (United Nations publication, 2021).
- 20 United Nations Human Rights Office of the High Commissioner, “Climate change exacerbates violence against women and girls”, 12 July 2022.
- 21 United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), *From Insights to Action: Gender Equality in the Wake of COVID-19 Report* (New York, 2020).
- 22 UN Women, “Explainer: how gender inequality and climate change are interconnected” (see chap. 1, footnote 14).
- 23 UN Women Fiji Multi-Country Office, “Why is climate change a gender issue?”. Available at www.unclearn.org/wp-content/uploads/library/unwomen704.pdf.
- 24 UN Women, *Women and Girls Left Behind: Glaring Gaps in Pandemic Responses* (New York, 2021).
- 25 *The Long Road to Equality: Taking Stock of the Situation of Women and Girls in Asia and the Pacific for Beijing+25 - A Synthesis Report* (United Nations publication, 2020).
- 26 UN Women Fiji Multi-Country Office, “Why is climate change a gender issue?” (see chap. 1, footnote 14).
- 27 Maria Hasan, “Persons with disabilities in a just transition to a low-carbon economy”, policy brief (Geneva, ILO, 2019).
- 28 United Nations Human Rights Office of the High Commissioner, “Human rights of older women: the intersection between ageing and gender” (A/76/157).
- 29 International Labour Organization, “The role of the ILO in addressing climate change and a just transition for all” (BG.338/POL/1).
- 30 United Kingdom and others, “Supporting the conditions for a just transition: green growth, decent work, and economic prosperity in the transition to net zero”, United Nations Climate Change Conference UK2021, Glasgow, November 2021. Available at <https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/>.
- 31 *2022 Review of Climate Ambition in Asia and the Pacific: Raising NDC Targets with Enhanced Nature-based Solutions with a Special Feature on Engagement of Children and Youth in Raising National Climate Ambition* (see chap. 1, footnote 13).
- 32 Intergovernmental Panel on Climate Change, *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK and New York, NY, Cambridge University Press, 2022).
- 33 United Nations Children’s Fund, *The Climate Crisis Is a Child Rights Crisis: Introducing the Children’s Climate Risk Index* (New York, 2021).
- 34 *Review of Climate Ambition in Asia and the Pacific* (see chap. 1, footnote 13).
- 35 United Nations Children’s Fund, “Engaged and heard! Guidelines on adolescent participation and civic engagement” (2020). Available at www.unicef.org/media/73296/file/ADAP-Guidelines-for-Participation.pdf.
- 36 *2022 Review of Climate Ambition in Asia and the Pacific: Raising NDC Targets with Enhanced Nature-based Solutions with a Special Feature on Engagement of Children and Youth in Raising National Climate Ambition* (see chap. 1, footnote 13).



PART II



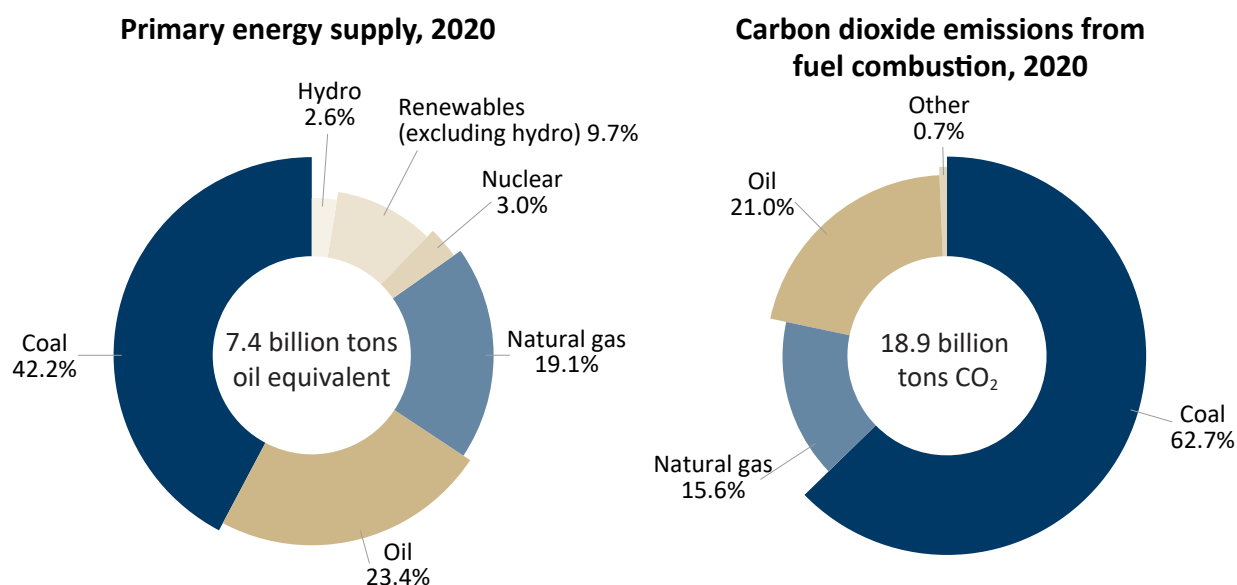
CLOSING EMISSION GAPS IN KEY SECTORS

CHAPTER 2

ACCELERATING THE ENERGY TRANSITION

Asia and the Pacific is responsible for 60 per cent of global energy-related CO₂ emissions. The region released 18.9 billion tons of CO₂ from fuel combustion and recorded its highest-ever global share of energy-related emissions in 2020. This share is driven by fossil fuels-based energy, which has powered rapid socioeconomic development in recent decades. In many economies, the most carbon-intensive of fossil fuels – coal – has long been a main source of energy. The continued and growing reliance on coal largely explains the region’s high – carbon output. In 2020, coal accounted for 42.2 per cent of the total energy supply, but 62.7 per cent of the region’s energy-related emissions (figure 2.1). Natural gas and oil account for one third of CO₂ emissions. Gas consumption in industrial and power sectors is on the rise. Demand for oil is steadily growing, particularly from the region’s transport sector.

Figure 2.1. Carbon dioxide emissions by fuel source in Asia and the Pacific, 2000-2020

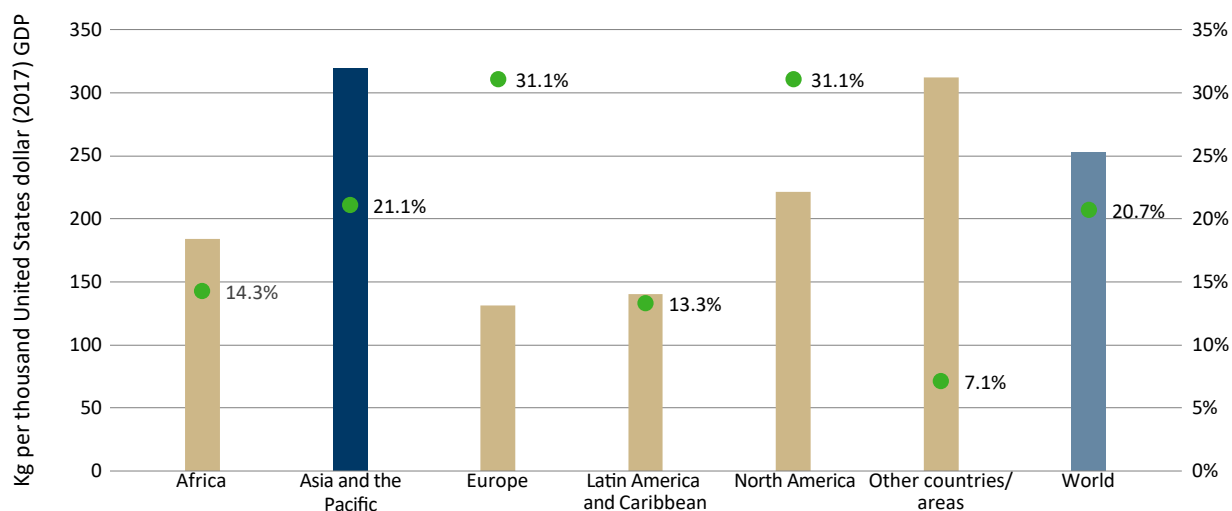


Source: ESCAP calculations based on data from International Energy Agency, World Energy Statistics and Balances database. Available at www.iea.org/data-and-statistics/data-product/world-energy-statistics-balances.

China emits more CO₂ than the rest of the region combined and determines regional and global energy consumption and emissions profiles. In 2020, the next top five emitters – India, the Russian Federation, Japan, the Islamic Republic of Iran and the Republic of Korea – together emitted more than Africa, Europe, and Latin America and the Caribbean combined. On a per capita basis, the Asia-Pacific region emits less than North America and Europe, but more than Africa, and Latin America and the Caribbean. Four out of the world's top five most populous countries are in Asia and the Pacific and these countries are now responsible for most of the world’s energy-related emissions. While emissions in other regions are falling in both absolute terms and per capita terms, emissions continue to rise in Asia and the Pacific.

The region has been slow to pivot to low-carbon development and continues to record high-carbon intensity. In 2020, its carbon intensity was 319 kilograms of CO₂ emitted per thousand dollars of GDP generated. This was higher than all other global regions (figure 2.2), 27 per cent more than the global average and nearly 2.5 times Europe, the least carbon-intensive region. Carbon intensity is on a downward trajectory, but progress has slowed in the most recent period and emissions reductions in other regions are outpacing reductions in Asia and the Pacific. Between 2010 and 2020, the Asia-Pacific region's carbon intensity improved by 21.1 per cent, whereas North America and Europe cut emissions by nearly one third, making it urgent for the region to accelerate the transition to clean energy.

Figure 2.2. Carbon dioxide emissions from fuel combustion per gross domestic product, and improvement during 2010-2020



Source: ESCAP calculations based on data from International Energy Agency and World Bank, “CO₂ emissions from fuel combustion”, SDG Gateway Data.

Slow transition away from fossil fuels

The region's heavy reliance on fossil fuels is undermining climate action. Renewable energy capacity is increasing and some countries, such as Bhutan and the Lao People's Democratic Republic, have been able to capitalize on rich hydro resources to generate significant export revenues. However, despite this, coal, oil and gas, which make up 85 per cent of its primary energy supply, continue to power the region's economies.

China and India, the region's two largest energy and coal consumers, continue to build coal power plants and expand coal production. The installed capacity of China of renewable energy exceeded the 1,000 gigawatt threshold in 2021, but, on the other hand, the country was also involved in building more than half of the new coal power station capacity around the world. India is taking a similarly dual-sided approach, increasing domestic coal use and accelerating renewable energy deployment. In South-East Asia, no consensus on a coal phase down has been reached. Member States of the Association of South-East Asian Nations (ASEAN) have made no joint commitment to phase out the use of coal but, instead, have focused on securing supply.¹ In 2021, twelve Asia-Pacific countries² representing slightly less the 9 per cent of the regional coal power production signed on to *the Global Coal to Clean Power Transition Statement*, pledging to cease new unabated coal-fired power generation projects and transition away from coal by the 2030s for major economies and 2040s for others.

Natural gas and oil must also be replaced with clean options to realize climate objectives by 2050. Global coal, oil and gas supplies need to be phased out by 95, 60 and 45 per cent, respectively, by 2050 compared to 2019 levels to limit warming to 1.5°C. This assumes carbon capture and storage technologies become widespread, without which phaseouts should reach 100, 60 and 70 per cent by 2050, according to IPCC forecasts. Yet natural gas has been viewed by many countries in the region as a transition fuel, capable of supporting the move away from coal and for balancing variable renewable energy capacity additions.

Many countries plan to introduce natural gas into their energy mix or increase its use, but new infrastructure is capital intensive and could lock in investments that hinder climate action and increase exposure to energy price volatility. In recent years, high gas prices have destabilized several economies in the region. For example, in South Asia, gas shortages have led to rolling outages, the shutdown of industries and a lack of cooking fuels for households. Across the region, utility companies are feeling the pressure to increase power pricing. Recent volatile markets and the doubling of 2022 prices compared to 2021³ have depressed demand and put into question planned expansion of gas production at a time when national budgets are constrained and energy security concerns are running high.

Energy transition benefits

The transition away from fossil fuels to renewable energy is essential for all economies to support the global climate agenda while achieving economic, social and environmental benefits. Research suggests the unconsidered costs from the negative externalities of fossil fuel use – air pollution, health-care costs and lower economic activity – equal a large share of global economic output. The estimated value of local environmental and health benefits and the global avoidance of emissions derived from phasing out fuels, particularly coal, far exceed the costs of phasing out and transitioning to renewables.⁴

Population growth, urbanization and industrialization will continue to increase energy demand across the region. Fossil fuel import reliance is a top concern for many countries at a time when the economics of renewables and energy storage technologies are becoming increasingly more attractive.⁵ The electrification of end uses, essential to decarbonization, will continue to increase the share of electricity within the final energy consumption mix. Emerging technologies, such as green hydrogen, may bring disruptions to the energy sector and support accelerated transitions, particularly sectors, such as transport and industry.

Most countries are faced with the need to increase and diversify their energy supply. Expanding energy generation from renewables offers the most affordable option for many of them. The cost of renewable energy storage and that of variable renewable energies, such as solar and wind, have decreased dramatically. Mature technologies, such as hydropower, remain affordable in certain contexts. Investment costs for new fossil fuel capacity are rising amid increased environmental and emissions standards and are coupled with increasing generation costs due to higher fuel prices. For most countries, new renewable capacity is already cheaper than fossil fuel options on a levelized cost of energy basis. The construction of new fossil fuel and infrastructure risks stranded assets.

Presently, countries face immediate short-term needs to ensure adequate energy supplies, but they must plan for the long term. Accelerating the transition to renewable energy resources across sectors must be viewed as a means to adapt energy systems to the risks of rising fuel and carbon costs, while also lowering negative externalities. For this, comprehensive national planning that includes the power sector, electrification of end uses, alternative fuels and demand-side measures are required. Looking to the future, as green hydrogen production technologies reach commercialization, holistic planning that considers the potential demand for and production and transmission of hydrogen will help optimize energy system development and support decarbonization of hard-to-abate end-uses.

As the region looks to emerging advancements in green hydrogen production and its potential to decarbonize energy use outside the power sector, achieving a broad decarbonization potential requires regional planning and cooperation to lower the costs of production and to develop storage, transport and distribution infrastructure along integrated value chains built to common standards. Integrated policies for renewable energy supply, technology deployment and strengthened infrastructure must be introduced, while policy barriers that prevent or slow renewable energy development or favour fossil fuels must be removed.

Box 2.1. Methane emissions in the Asia-Pacific region

Methane, the main component of natural gas, is a greenhouse gas that has approximately 80 times more global warming potential compared to CO₂ for the 20-year time period, and approximately 28 for the 100-year time period.^a This is because methane breaks down significantly faster – slightly over a decade as compared to centuries for CO₂.^b Consequently, curbing methane emissions could provide short-term relief while governments negotiate the transition from fossil fuels to clean energy. The largest anthropogenic methane source is agriculture, at 25 per cent, followed by energy, at 23 per cent.^c Reducing oil and gas methane (14 per cent) is technically feasible, economically efficient and environmentally effective. In fact, oil and gas methane could be cut by 75 per cent using existing technologies – costing less than 3 per cent of oil and gas companies income accrued in 2022.^d Some other efforts to reduce emissions are improving existing venting, burning, and/or the flow of natural gas to reduce leakage and capturing methane generated by landfills, coal mines and wastewater-treatment plants to generate electricity, and more.^e

The Asia-Pacific region accounts for 43 per cent of global methane emissions.^f According to the International Energy Agency (IEA), Asia-Pacific oil and gas operators can use current technologies to cut methane emissions by 70 per cent by 2030, and that two thirds of these cuts are achievable at no net cost. As the most immediate action, companies should phase out routine gas venting and flaring, which would have direct economic and climate benefits. Companies in the region can also take action by joining the Oil and Gas Methane Partnership 2.0, a multi-stakeholder initiative launched by the United Nations Environment Programme (UNEP) and the Climate and Clean Air Coalition.^g

At the national level, policymakers could impose work practice standards, such as frequent leak detection and repair (LDAR) and restrictions on venting and flaring, as well as technology standards requiring the installation of energy efficient equipment with low emissions.^h Policymakers could ensure that methane emissions are counted as part of carbon tax, develop a methane procurement standard, impose methane border adjustments and require that imports meet the same work practice standards as oil and gas produced domestically. In addition, it is necessary to introduce methane measurement, reporting and verification (MRV) regulations that lay the groundwork for the implementation of policy instruments based on methane emissions quantification. Capacity-building is necessary to make sure the relevant regulatory agencies can effectively monitor and enforce the regulations once they have been adopted.

a Intergovernmental Panel on Climate Change, *Sixth Assessment Report: The Physical Science Basis* (Geneva, 2021).

b International Energy Agency (IEA), *Global Methane Tracker 2023* (Paris, 2023).

c Ibid.

d Ibid.

e Ilissa B. Ocko and others, “Acting rapidly to deploy readily available methane mitigation measures by sector can immediately slow global warming”, *Environmental Research Letters*, vol. 16, No. 5 (May 2021).

f IEA, *Global Methane Tracker 2022* (see chap. 2, box 2.1, footnote b).

g The Oil & Gas Methane Partnership 2.0 (OGMP 2.0). Available at <https://ogmpartnership.com/>.

h Kristina Mohlin and others, “Policy instrument options for addressing methane emissions from the oil and gas sector”, Environmental Defense Fund Economics Discussion Paper, EDF EDP 22-01 (New York, Environmental Defense Fund, 2022).

Many models within the region can be replicated for the integration of small- to large-scale renewable energy installations. Higher shares of renewables require larger, more responsive and flexible grid systems. Throughout the region, there are numerous examples of grid systems under which changing energy system supply and demand profiles is leading to the curtailment of renewable energy resources. Immediate, substantial investments are needed for the modernization and expansion of national power grids and the deployment of complementary technologies, such as smart grids and storage.

High capital costs are often a barrier to clean energy deployment and governments lack the capacity and funds needed to realize the energy transition. Evidence shows, however, that integrated and comprehensive planning lower costs significantly. Multilateral banks, development agencies and the private sector can be engaged at greater levels to inform planning and to act as innovators and investors, while governments can introduce, long-term strategies aligned with net zero by 2050, including quantifiable targets and timelines to establish policy predictability and create an enabling environment.

Planning and policies should consider synergies between various development goals. As grids are expanded and modernized to accommodate higher shares of renewables, socioeconomic benefits for businesses and households can be achieved alongside greater power supply capacities and reliability. Opportunities to transition away from traditional fuels to electric cooking and heating are increasing. This is contributing towards improved indoor air quality and a reduction in adverse health impacts, which, in turn, is helping to address one of the greatest challenges in the regional energy access agenda under the Sustainable Development Goals.

Supporting a just energy transition

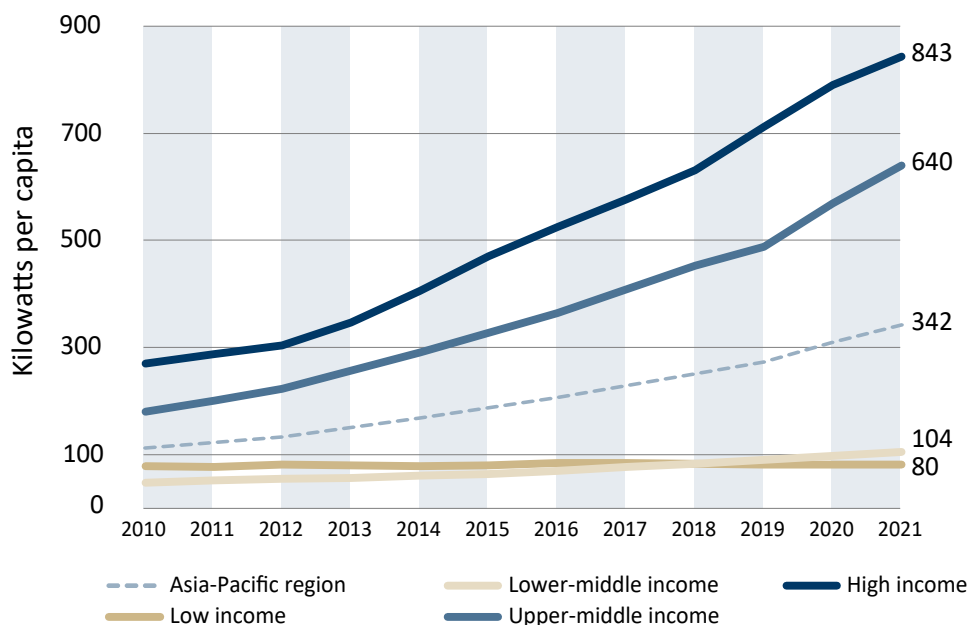
Access to renewable energy is unequal across Asia and the Pacific, and the consumption is not increasing in most countries despite a rise in renewable energy installations. Renewable energy capacity additions are concentrated in a small number of economies, and a growing divide exists between poorer and richer countries in terms of per capita installed renewable energy capacity. Renewable energy installations in Asia-Pacific high and upper-middle income countries are vastly outpacing low and lower-middle income countries. In 2021, per-capita capacity in high and upper-middle income groups more than tripled from 2010 levels, and was eightfold and sixfold that of the lower-middle income groups, respectively. Over the same period, there was virtually no change in low-income countries. Transitioning to clean energy is currently uneven and incremental, and therefore progressing too slowly. Technical and financial support that is focused on disadvantaged economies to ensure all countries unlock the benefits of clean and sustainable energy is critical.

Technical capacities to plan, develop and operate renewable facilities must be increased. Fossil fuel industry workforces require training to be able to transition to clean energy jobs or other sectors. Ensuring sufficient investment requires greater capacity of domestic finance institutions, introduction of risk mitigation instruments, and improved access to structured finance and capital markets. Major financing deals, such as Just Energy Transition Partnerships (JETPs), have the potential to ramp up renewable energy deployment and energy efficiency and lead to the phasing out of coal power plants, including many before the end of their useful life.

Indonesia plans to mobilize \$20 billion over the next three to five years to accelerate the energy transition under its JETP programme, limit power sector emissions by 2030 and align the energy sector with the country's net-zero target by increasing the generation of renewable energy and phasing down the use of coal. The plan, however, does not stop the construction of coal power plants already tendered out, underscoring that even with major financing available, the transition away from fossil fuels is a gradual process. Viet Nam has struck a \$15.5 billion deal that targets 47 percent renewable power generation supported by strengthened grid infrastructure by 2030. This emphasizes the need to protect vulnerable groups who may be affected by the clean energy transition.

As countries deploy renewable energy capacity, they must consider the steps needed to phase out existing fossil fuel infrastructure. Strategies for coal power may include the renegotiation of power supply contracts to allow plants to operate flexibly. This could enable the minimization of coal as a baseload supply, making it possible for utilities to incorporate greater flexibility to enable the introduction of variable renewables and support a gradual coal phase out and avoid an abrupt halt in operations.

Figure 2.3. Renewable electricity capacity per capita, by Asia-Pacific income group



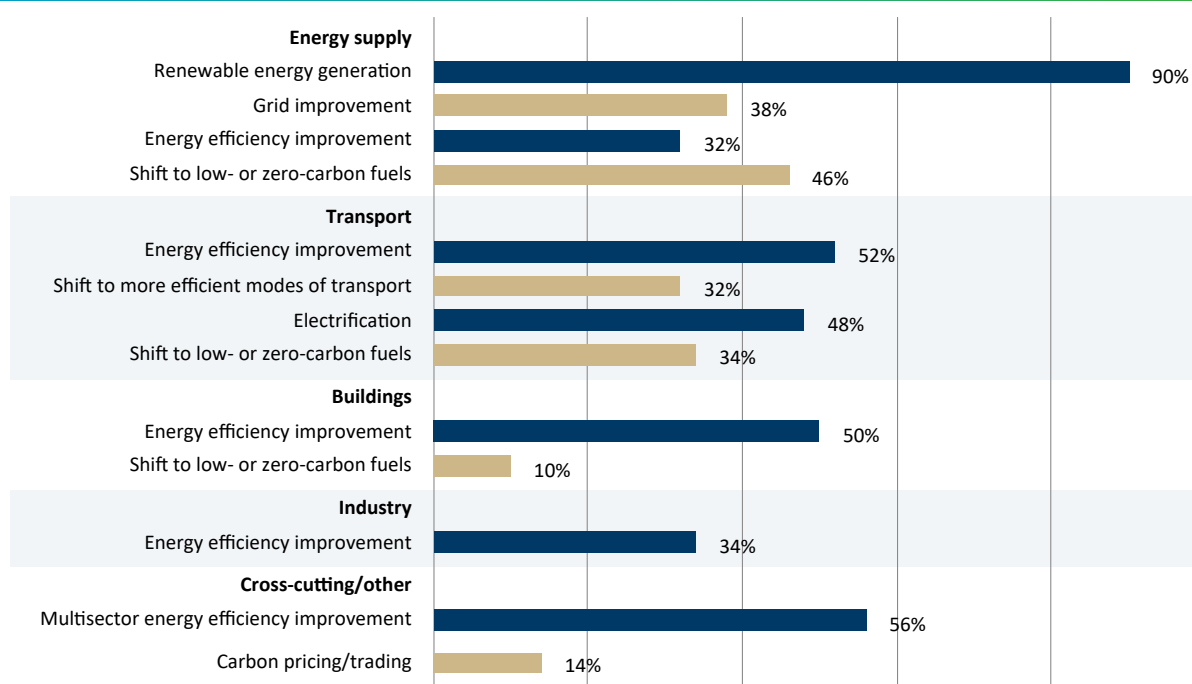
Source: ESCAP calculations based on data from International Renewable Energy Agency, *Renewable Capacity Statistics 2022* (Abu Dhabi, 2022).

Scaling up renewable energy targets in national determined contributions

Energy-related mitigation measures identified in NDCs need to be more comprehensive and ambitious. They currently capture strategic areas where progress is needed, but fail to make commitments at the necessary level. Most countries have not communicated renewable electricity target shares at a level necessary to contain global warming at 1.5°C.⁶ Less than half of them have provided quantifiable targets for renewable energy and only a small number have put forward specific energy efficiency targets. Stronger statements on renewable energy and energy efficiency have been made by countries with a high dependency on fossil fuel imports, where lower fossil fuel consumption is equated to increased energy security. Coal phasedowns in NDCs are generally presented in the context of shifting to natural gas or liquified natural gas (LNG). This would reduce carbon intensity, but it does not sufficiently reduce emissions.

The more efficient use of fossil fuels is a strategy central to most NDCs and national policy frameworks because energy security remains a pre-eminent concern in most countries. Economies that rely heavily on coal are looking to coal gasification and liquification, and ultra-critical coal technologies. Others point to improving the quality of petroleum fuel in the transport sector, such as compliance with European Union standards and modernizing the vehicle stock. Electrification of transport is mentioned in approximately half of NDCs, but few governments have conducted the in-depth analysis and planning needed to push e-vehicles more aggressively into national markets.

Figure 2.4. Share of Asia-Pacific to the UNFCCC Parties that refer to specific energy-related measures in nationally determined contributions



Source: ESCAP review of NDCs.

Note: In NDCs from countries in Asia and the Pacific, renewable energy generation is the most frequently mentioned energy-related climate mitigation measure. It appears in 90 per cent of the contributions. Multisector energy efficiency and energy efficiency in transport and buildings appear in approximately half of NDCs, along with the electrification of transport. The shift to low- or zero-carbon fuels appeared in just under half of NDCs.

Many Asia-Pacific countries have not yet identified how to transform their energy sectors and achieve their national development objectives in a challenging context. The COVID-19 pandemic has led to increased public expenditure and fiscal positions have been further affected by energy price increases and value chain disruptions. As energy security is increasingly a concern, the level of ambition in energy transition strategies have suffered. The uptake of renewable energy requires the transformation reform of national energy systems. To achieve this, new technical capacities and significant investment in supply and grid infrastructure development, with private sector involvement, are needed. Comprehensive national standards and codes are required to accelerate the uptake of the technologies required to accelerate energy efficiency.

While ambitious scenarios have been put forward, many are beyond existing national capabilities and resources. There is a large gap between non-conditional energy-related commitments and the conditional commitments on phasing out fossil fuels and scaling up renewable energy and energy efficiency that are tied to the receipt of international technical and financial support. For many countries, NDCs are a request for assistance to meet those higher-level ambitions, which, to date, has not yet materialized at the scale required. Additionally, even if the more ambitious conditional targets are met, they are still insufficient to contain global warming to 1.5°C. Accordingly, economies should also be looking to examine opportunities to reallocate government expenditures and strengthen domestic policy environments to mobilize more private finance (see chapter 5 for a discussion on finance). Engaging in South-South knowledge exchange and regional cooperation platforms can be a valuable strategy to learn from based on the experiences of other economies in these areas. Additionally, the remaining gap must be filled with international technical and financial support.

Cross-border grid connections for renewable energy

Essential to putting the energy sector on a low-carbon pathway lies in the development of regional markets to trade renewable energy resources. Renewable energy resource endowments are unevenly distributed across the region. Some countries' holding potential far exceeds domestic demand, while others lack economically exploitable resources. Technical, institutional and financial capacities are equally varied. Without connectivity beyond national borders, economies will not be able to achieve net-zero ambitions in a timely and affordable manner.

Developing regional markets requires coordinated planning, the financing and development of cross-border grid infrastructure, harmonized policies and regulations, and aligned operational procedures. Successful initiatives to develop cross-border connectivity and multilateral power trade results in increased grid balancing areas that support higher levels of affordable renewable energy resources. Grids that extend over large geographic territories and frameworks for multilateral power trading enable the balancing of supply and demand for renewable energy resources, such as wind and solar energy. This is important as renewables are affected by daylight hours, seasonal cycles and weather conditions.

Establishing multilateral trade and competitive markets for cross-border renewable energy trade requires enabling frameworks. These include intergovernmental agreements on energy cooperation and interconnection, coordination of grid planning efforts and operational procedures, and harmonization of institutional policies and regulatory regimes. Following the establishment of such agreements, multilateral institutions are needed to support technical collaboration and the development and supervision of multilateral trading mechanisms, such as power exchanges, energy system operations, transaction settlements and dispute mediation.

Numerous coordination mechanisms already exist and many preliminary efforts on regional power grid integration have been made. ASEAN has a long-standing goal to develop the ASEAN Power Grid (APG). Organizations, such as the ASEAN Centre for Energy and the Heads of the ASEAN Power Utilities and Authorities, support the development of APG through analytical work and by enabling collaboration among relevant stakeholders.

The technical ability to develop new cross-border connections and markets exists, but progress has been limited. The lack of cross-border grid infrastructure is the result of financial and political barriers. Outside of Central Asia, the region lacks institutions with the authority to implement processes and detailed market design. The aforementioned ASEAN Centre for Energy and the Heads of the ASEAN Power Utilities and Authorities primarily support collaboration and make policy recommendations. Ultimately, however, the development of cross-border connectivity initiatives depends on national policymakers, utilities and regulatory authorities. This results in ad hoc and primarily bilateral progress. In North-East Asia, similar institutions are entirely absent and there is no common vision for increased connectivity or how to achieve it.

Building on existing bilateral and multilateral infrastructure development and trade efforts in the Asia-Pacific region can support the gradual introduction of larger and more complex multilateral trade systems. In South-East Asia, multilateral power trade through APG is recognized as being key to lowering the cost of the renewable energy supply and increasing regional energy security. The recently launched Laos-Thailand-Malaysia-Singapore Power Integration Project represents the first multilateral cross-border electricity trade network in the Asia-Pacific region, albeit it is limited in size and direction. A regional electricity market is still absent.

To take a step towards addressing these challenges, ESCAP member States have endorsed the Asia-Pacific regional road map on power system connectivity.⁷ The road map presents a vision, a set of principles and nine strategies to increase sustainable power system integration in the region. ESCAP is working with member States to implement the road map strategies, which can inform

and strengthen existing initiatives in energy trade and support the development of new initiatives in areas where they are absent. To move forward, further studies are needed to confirm the technical feasibilities of multilateral renewable energy trade, explore the socioeconomic benefits and cost advantages of pursuing the energy transition through regional connectivity and market development, identify barriers to progress and suggest recommendations to overcome them.

Box 2.2. Expansion of solar photovoltaic in China

Regionally and globally, China offers a unique example of renewable energy technology development and application. The country has planned and built renewable energy technology value chains, dominated global manufacturing and markets, and deployed the world's largest renewable electricity generation capacity.

China controls more than 80 per cent of global solar panel manufacturing, and has captured the bulk of the global supply chain, including polysilicon, ingots, wafers, solar cells and modules.^a Continued expansion is expected.

The country's solar strategy has made it the world's largest producer, seller and user of solar photovoltaic (PV) technology. It has more than 300 gigawatt of installed capacity, greater than the next four countries (the United States, Japan, Germany and India) combined. In 2021, China installed 55 gigawatt of solar, and exported modules surpassing 100 gigawatt. Manufacturing capacity was expected to reach approximately 600 gigawatt by the end of 2022, nearly double that of the previous year.

To achieve this position, the Government of China has given the solar industry strategic importance within its development agenda and introduced a long-term development approach. It has presented policies, plans and targets, extensively supported research and development, and offered substantial government investment and incentives for the sector's enterprises. Targets were set and reset with greater ambition for national and provincial capacity installations, technology pricing and employment. Technology prices subsequently dropped dramatically and the Government continuously lowered subsidies for major new solar installations until 2021, when they were dropped altogether.

To continue expanding its manufacturing capacity, China has focused intensely on its industry competitiveness in the international market. The One Belt One Road initiative has been an avenue for exporting solar modules through project development and construction.

The International Energy Agency estimates that reaching net-zero emissions by 2050 requires that global annual solar PV additions must quadruple and production capacity needs to double by 2030. China, because of its dominance of the sector, will be at the centre of progress at least in the short term, but other countries must boost their ambitions, perhaps by drawing from the lessons learned from the solar PV industry in China.

^a International Energy Agency, *Special Report on Solar PV Global Supply Chains* (Paris, 2022).

Focused efforts at the subregional level include the development of a pathway towards power grid connectivity in North-East Asia in the form of a green power corridor road map. A green power corridor is defined as an initiative that provides an enabling institutional, financial, regulatory, political and social environment for strengthening the regional power grid connectivity for increased access to clean, affordable and secure electricity supply. It supports national emissions reduction and renewables development goals, and is developed in coordination with national energy strategies, power grid development plans and regulatory frameworks.

A critical element of a green power corridor road map is the development of a common understanding of the potential technical, economic and sustainability implications associated with the integration of a cross-border power system coupled with the deployment of renewable energy and other low-carbon generation technologies. ESCAP and its project partner are modelling the implications of increased deployment of renewable energy and cross-border power system integration under a set of relevant scenarios. Lessons learned from this project are informing the development of a green power corridor framework, which will include a set of principles for ensuring that power system connectivity initiatives are aligned with and supportive of sustainable development.

Box 2.3. Localizing solar photovoltaic technology in Fiji

Though Fiji has access to abundant natural resources and considerable potential to develop renewable resources, its energy-related emissions are nearly all from imported oil used to generate power and fuel the transport sector. The country's NDCs have reiterated the National Climate Change Policy, under which 100 per cent of national electricity production is to be derived from renewable energy sources by 2030, and the transport sector is to be decarbonized. The policy is also aimed at ensuring that Fijians have access to affordable, clean and reliable electricity and transport.

In 2020, the renewable share of the country's electricity generation was at 60 per cent, the bulk of which was derived from hydropower, with biomass, solar and wind contributing smaller shares. To achieve the 100 per cent target, a more rapid phase out of fossil fuel-based power generating and ramping up renewables are required. Solar power was estimated to be the best, lowest-cost renewable power supply option for the country, although reaching the target requires a diversified mix of renewable resources in combination with battery storage and power grid strengthening.

Innovative approaches are needed for the local application of solar technology. The State-owned utility has several utility-scale solar projects in the pipeline, which is critical to the achievement of the target, but smaller distributed systems also play an essential role. Due to its dispersed population and archipelagic geography, much of the rural population must rely on off-grid or small community-based systems. The Government of Fiji has introduced the use of renewable energy resources for electrification in rural areas, which aims to reduce reliance on imported fossil fuels and improve rural livelihoods. Private sector actors have also emerged as key players in the off-grid market by installing PV panels combined with battery banks to power homes and facilities across islands. Donor support through small grants is helping accelerate community-level installations.

Additionally, some pioneering approaches are emerging in the power and transport sectors. On one island, an "agrophotovoltaic" project is being launched to help its electricity supply reach 50 per cent renewables. The project will enable solar power generation and agriculture to coexist on the same land in a cost-effective manner and deliver crop yield benefits. In late 2022, the solar boat was launched in the Pacific as a pilot to show its benefits for local fisherwomen. It sets an example for further use of solar energy for small maritime transport and may inform actions supporting the country's goal of a 40 per cent reduction of greenhouse gas emissions from the domestic maritime sector by 2030.

Learning from pilot demonstrations and scaling effective technological and business approaches is critical in the near term. Fiji has many constraints to overcome, including acquiring appropriate technologies that can meet local needs, developing localized and climate-resilient applications, and building institutional capacities and private sector participation to implement its ambitious energy policies.

Setting industry on a low-carbon pathway

In the industrial sector, the heavy reliance on fossil fuels remains a challenge for decarbonization, particularly for industries involved in steel and cement production. Electrification where possible is key, such as by using electric arc furnaces to process recycled steel. Shifting to green hydrogen-based production methods is needed in refineries, the chemical industry and at cement and steelmaking facilities. Incentivizing to put these processes on a low-carbon pathway, while avoiding carbon-intensive new industrial infrastructure is important, alongside the increased use of renewables for power and green hydrogen production. Across industrial sectors, governments should consider incentivizing research and development, and the uptake of low-carbon technologies. Carbon capture and storage has a role to play in this process, but increased investment in research and development is needed to make this technology commercially viable.

Improving energy efficiency to reduce energy intensity

Mitigation strategies and their ability to reduce energy-related greenhouse gas emissions depend on the existing energy mix and economic structure of the country where they are being implemented. Intelligently replicated best practices can nonetheless help reduce energy consumption, lower emissions and improve energy sector resilience. Energy efficiency can make a major contribution towards reducing demand and greenhouse emissions by lowering exposure to high energy prices and supporting increased energy security. Economically, it is more affordable than adding new supply, which is a key consideration for economies grappling with constrained fiscal space due to the cost of energy subsidies extended to soften the economic impacts of the COVID-19 pandemic and recent high energy prices.

Promoting fuel efficiency and energy performance standards

The transport sector represents one fifth of the region's energy consumption. This share is increasing and largely fuelled by oil, aided in part by the rapidly growing number of cars in the region. Accordingly, there is an urgent need to mitigate the emissions from them. In the longer term, electrification is part of the answer. While the electric vehicle stock is increasing, it is still a very small share of the transport sector. As a consequence, more stringent fuel efficiency standards to lower carbon emissions are needed. Existing standards should be expanded and fuel economy ambitions need to be strengthened. Regional cooperation should support this process as demonstrated by ASEAN member States, which have put forward a fuel economy road map for light-duty vehicles. The road map contains an aspirational target to reduce the average fuel consumption of new light-duty vehicles sold in the region by 26 per cent between 2015 and 2025.

Minimum energy performance standards (MEPS), particularly those that target performance levels based on best-available technology, can lower energy demand and related emissions, but only a few NDCs refer to them. MEPS for air conditioners, lighting, motors and refrigerators can deliver the bulk of appliance energy savings and should be prioritized alongside boiler efficiency. They have the added benefits of increasing grid stability and energy security and preventing inefficient technologies from being exported to markets with less stringent energy efficiency standards. Implemented with effective incentive programmes, MEPS can support the phase out of the least efficient products from markets and accelerate clean energy technology development, manufacturing and trade. Five Asia-Pacific countries⁸ have signaled their commitment at the global level to product standard alignment, actions for priority products and policy promotion by signing of the Super-Efficient Equipment and Appliance Deployment Call to Action.⁹

Regional MEPS harmonization and standardized labelling, which is being pursued in the ASEAN region, can unlock significant energy and climate benefits. ASEAN regional MEPS for lighting, appliances and equipment have the potential to reduce electricity use by 9.5 per cent, prevent forty-four 500MW power plants from being built and result in emissions savings equivalent to taking 190 million cars off the road by 2030.¹⁰

Regional MEPS also offer advantages throughout the supply chain by reducing costs for manufacturers, simplifying compliance procedures and opening cross-border markets, which reduce technology costs.

Improving energy efficiency in the building sector

In the building sector, according to the IEA, setting energy efficiency building codes to attain net-zero readiness for new construction by 2030 and upgrading existing building stock are needed to achieve the 1.5°C target. The sector, in the long term, must look to whole-life net zero by 2050. National and local building regulations urgently require mandatory codes based on local climate conditions.

The building sector is often poorly regulated in Asia and the Pacific. Energy performance standards, renewable energy requirements and a life-cycle carbon assessment approach to construction materials and operations are needed in many developing countries. This would entail incorporating high-energy performance requirements for building envelopes and mechanical systems. Digitalization and energy management systems can further optimize a building's energy performance. Building energy performance reporting, including at the time of sale or lease, encourages building developers and owners to consider building performance. To effectively implement such strategies, it is necessary to monitor building construction and renovation to clamp down on buildings being built or renovated outside the formal regulatory environment.

Improving industrial energy efficiency

The adoption of international energy management standards, energy efficiency services and continuously updated sectoral clean energy targets is necessary in large carbon-intensive industries and small and medium-sized industries. Motor systems, combined heat and power, steam systems, process integration and energy recovery are areas under which energy efficiency improvements are possible. Each industrial sector has its own technological and energy management requirements and strategies, but well-enforced mandates are the basis for transformation. Comprehensive enabling frameworks that integrate research and development, economic incentives and access to low-cost capital are then needed to make it happen.

Adaptation in the energy sector

Climate change is already having a detrimental impact on energy systems, and shifting environmental conditions requires fundamental adjustments. The immediate concern is climate change-induced extreme weather events and natural disasters, which regularly damage national energy systems, interrupt energy services and destroy physical infrastructure. In recent years, highly stressed power systems across the region have been unable to meet electricity demand during heatwaves. Typhoons have disrupted power grids. Flooding has inundated grid stations, swept away gas pipelines, threatened thermal power plants and led to the collapse of a hydro dam under construction. Many power plants and electrical grids across the region are exposed to multi-hazard disaster risks.

Longer-term consequences are likely to affect hydropower, which accounts for the largest share of the region's installed renewable energy capacity and more than half of power generation in several countries in Asia and the Pacific.¹¹ Hydropower offers critical power system flexibility, but it is becoming increasingly unreliable. Heatwaves and droughts have shrunk rivers that feed reservoirs and reduced hydropower generation. Debating over whether water should be used for power rather than agriculture, fisheries and transport is increasing. For South and South-East Asia, IEA forecasts an average decrease of 4.6 per cent in hydropower capacity over the next four decades due to changing climate conditions.

Adaptive strategies are essential to build greater climate resilience. Climate risk analysis and planning is necessary for economies to identify points of vulnerability and climate-proof existing and future energy infrastructure. Much of the region's supply and distribution infrastructure requires upgrade and, therefore, potentially vulnerable to extreme weather and periods of high demand.

By 2030, half of existing hydropower capacity in Asia outside of China will either have undergone or be due for modernization.¹² Modernizing existing infrastructure helps to climate-proof energy systems and also increase generation efficiency and capacities. This should offer greater grid flexibility. Sector-specific climate resilience guidelines, which have been developed and piloted in the region, offer a valuable resource for energy system assessments and planning.

Strengthening regional cooperation

Regional MEPS promotion and standardization can boost energy efficiency, reduce manufacturing costs and support the development of large, regional markets that can take advantage of economies of scale. ASEAN has already carried out a lot of work in this area. A wider regional initiative could build on this foundation, while taking advantage of lessons learned.

The development of regional net-zero focused green construction communities could support the sharing of technical knowledge and strategies, as well as the development of national building performance standards.

Increasing regional connectivity could enable the integration of higher shares of renewable energy. It would create economic opportunities by giving suppliers of electricity access to additional markets and consumers access to lower-cost resources. Continued regional efforts supporting cross-border power grid integration are needed to enable higher penetration levels of renewable energy, in line with the regional road map on power system connectivity. To achieve cross-border power grid connectivity and the benefits it offers for renewable energy integration, regional initiatives focused on the political and technical aspects of the issue are needed, including consensus-building through dialogue and capacity-building for utilities and system operators and regulators.

Regional cooperation is needed to support emerging technologies. Asia and the Pacific represents a high potential market for green hydrogen. This rich renewable energy resource has great potential to provide cheap, low-carbon electricity in some countries. Although green hydrogen is appearing in national policy agendas, developing this renewable resource at scale and enabling market trade require regional-level coordination, common standards and frameworks that consider the whole value chain and generate demand. This is key to overcome high production, transportation and storage costs.

ENDNOTES

- 1 Joint Ministerial Statement of the 40th ASEAN Ministers on Energy Meeting, 15 September 2022.
- 2 Azerbaijan, Brunei Darussalam, Indonesia, Kazakhstan, Nepal, New Zealand, the Philippines, the Republic of Korea, Singapore, Sri Lanka and Viet Nam. Indonesia and the Philippines gave their pledges with caveats. The full list of committed parties can be accessed at <https://ukcop26.org/global-coal-to-clean-power-transition-statement/>.
- 3 Sam Reynolds, "Asia's lower LNG demand in 2022 highlights challenges for industry growth", Institute for Energy Economics and Financial Analysis, 11 January 2023.
- 4 Sebastian Rauner and others, "Coal-exit health and environmental damage reductions outweigh economic impacts", *Nature Climate Change*, vol. 10, No. 4 (2020), pp. 308–312.
- 5 Tobias Adrian, Patrick Bolton and Alissa M. Kleinnijenhuis, "The great carbon arbitrage", Working Paper, No. 2022/107 (Washington, D.C., IMF, 2022).
- 6 IPCC suggests that a range of 47–65 (median 54) per cent renewable energy electricity share is consistent with 1.5°C pathways.
- 7 United Nations, Economic and Social Commission for Asia and the Pacific, "Regional road map on power system connectivity: promoting cross-border electricity connectivity for sustainable development". Available at www.unescap.org/our-work/energy/energy-connectivity/roadmap.
- 8 Australia, India, Indonesia, Japan and the Republic of Korea.
- 9 More information is available at www.cleanenergyministerial.org/initiatives-campaigns/super-efficient-equipment-and-deployment-sead-initiative/?_years=2021.
- 10 ASEAN Centre for Energy and United Nations Environment Programme United for Efficiency (U4E), "Regional savings assessment Association of Southeast Asian Nations" (August 2021). Available at <https://aseanenergy.org/regional-savingsassessment-association-of-southeast-asian-nations/>.
- 11 Afghanistan, Bhutan, Cambodia, Georgia, Kyrgyzstan, the Lao People's Democratic Republic, Myanmar, Nepal and Tajikistan.
- 12 David Morgado and others, "Hydropower modernization needs in Asia" (Beijing, Asian Infrastructure Investment Bank, 2020).

CHAPTER 3

TOWARDS LOW-CARBON MOBILITY AND LOGISTICS

Challenging road ahead

Fragmented, shaped by personal choices and heavily reliant on fossil fuels, the transport sector is one of the most challenging sectors to be set on a low-carbon pathway. More than 90 per cent of its energy is derived from oil products.¹ To contain global warming at 1.5°C and reach net-zero carbon by 2050, transport CO₂ emissions need to decrease by a minimum of 3 per cent annually. Yet, they have grown at an annual average rate of 1.7 per cent between 1990 and 2021, more rapidly than in any other sector.² Emissions have also increased by 8 per cent between 2020 and 2021 following the elimination of COVID-19-related restrictions.³ Even if all mitigation commitments to decarbonize transport were fully implemented, global CO₂ emissions from transport would still increase by 16 per cent by 2050 from 2015 levels.⁴

In Asia and the Pacific, transport is responsible for 27 per cent⁵ of CO₂ emissions, higher than the global average. These emissions are growing rapidly despite technological advances and low-carbon measures. The significant growth in transport demand, which is strongly correlated to economic development and population growth, has outpaced the speed at which technological advancements can improve fuel and vehicle efficiencies. China and India make up the bulk of emissions, accounting for 58 per cent of the total transport emissions in the region.⁶ Without more ambitious action, transport demand and CO₂ emissions in Asia and the Pacific could increase by more than 50 per cent by 2050.⁷

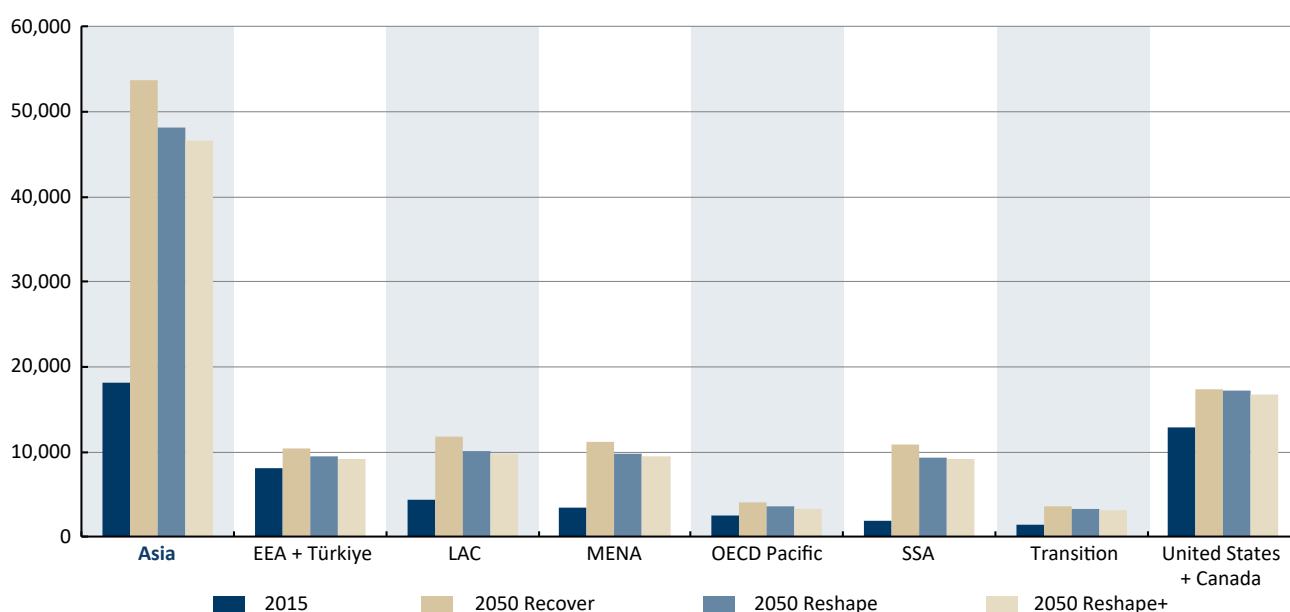
Effective policies to put the sector on a low-carbon pathway can be placed into five categories: (a) improving the design, operations and planning of transport systems; (b) electrification; (c) the use of low-carbon fuels; (d) encouraging different modes of transport and better management of demand; and (e) innovating and upscaling transport solutions. Such policies can take the form of economic and fiscal or regulations, or relate to infrastructure, innovation and awareness-raising.⁸ Ultimately, these policies need to change travel behaviour for passenger transport and logistics operations for freight transport and must improve vehicle, fuel and system efficiencies for passenger and freight transport activities. Comprehensive policy packages are, therefore, required.

Many decarbonization policies are already in place in countries throughout the region where sustainable passenger transport with low- or zero-carbon intensity is encouraged, such as public transport, walking and cycling. The development of low-carbon freight transport is, however, still in its early stages. More wide-ranging policies to increase freight transport system efficiency and improve freight fuel efficiency are needed. Non-urban passenger transport, and regional and intercity travel is another area of rapid growth in Asia and the Pacific. This requires the decarbonization of air, road and rail transport for the longer distances travelled between cities and rural areas.

Transport demand still increasing at a rapid pace

Transport demand in Asia and the Pacific has been increasing over the past three decades due to population growth, economic development, urbanization and motorization. Passenger and freight transport demand has been rapidly growing in Asia and the Pacific compared to other regions. This demand is projected to increase by 150 per cent between 2015 and 2050 under a business-as-usual scenario following the recovery from the COVID-19 pandemic.⁹ Passenger transport demand tends to increase most significantly in regions where population and economic growth are expected to be the highest. The Asia-Pacific region has become the largest regional vehicle market, accounting for 48 per cent of global sales in 2019.¹⁰ Passenger transport demand in Asia is forecast to increase the most compared to other regions by a significant margin (figure 3.1).

Figure 3.1. Demand for passenger transport by world regions to 2050

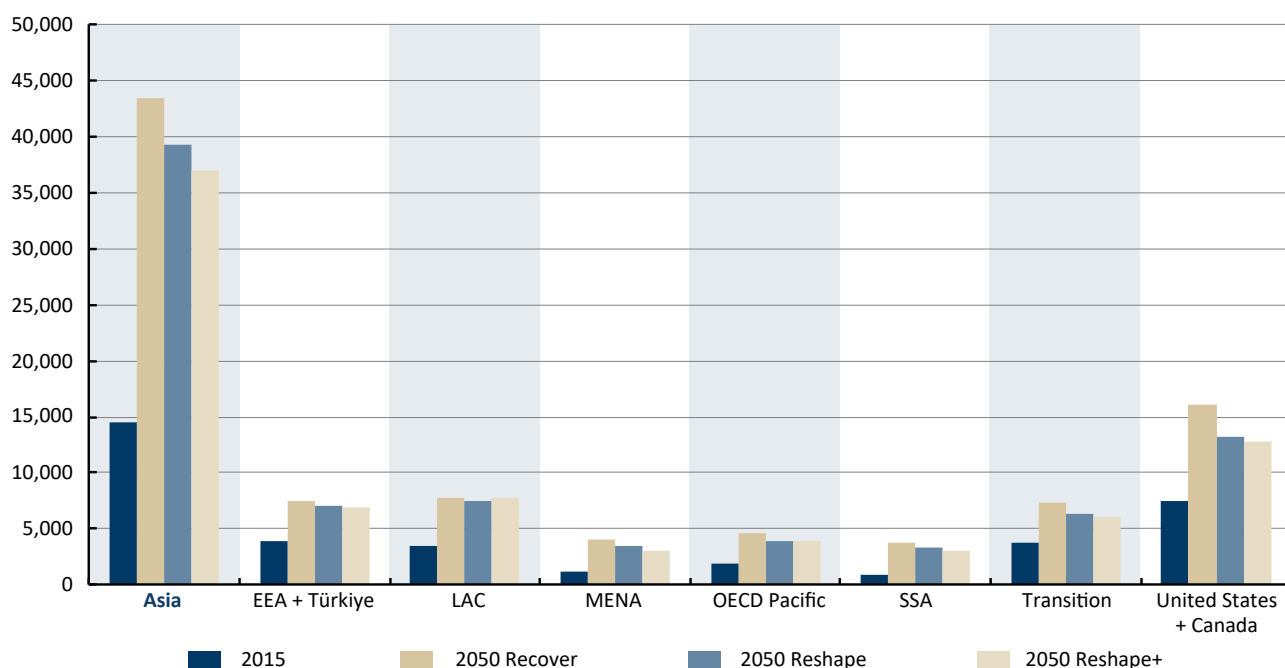


Source: International Transport Forum (ITF), *ITF Transport Outlook 2021* (Paris, OECD Publishing, 2021).

Note: Recover, Reshape and Reshape+ refer to the three scenarios modelled, which represent increasingly ambitious post-pandemic policies to decarbonize transport. EEA, European Economic Area; LAC: Latin America and the Caribbean; MENA: Middle East and North Africa; SSA, sub-Saharan Africa. Transition economies includes the former Soviet Union and non-European Union South-Eastern Europe. OECD Pacific includes Australia, Japan, New Zealand and the Republic of Korea.

Private vehicles in the region contribute to more than 60 per cent of urban transport CO₂ emission. Despite this, the motorization rate in the region is still relatively low, at an average of 356 per thousand population,¹¹ has the potential to further increase. Of concern, however, is that the relatively low motorization rate is already causing severe levels of local air pollution, road fatalities and congestion in Asian cities, in addition to CO₂ emissions. Accordingly, efficient low-carbon transport policies would also need to address other transport externalities simultaneously to be truly sustainable. Freight flows to Asia, from Asia and within Asia are expected to increase at a greater rate in comparison to other regions.¹² Freight transport activities in Asia represent almost 40 per cent of global freight activity and are projected to grow to 46 per cent by 2050¹³ (figure 3.2).

Figure 3.2. Demand for surface freight transport by world regions to 2050



Source: ITF, *ITF Transport Outlook 2021* (see chap. 3, table 3.1).

Notes: Recover, Reshape and Reshape+ refer to the three scenarios modelled, which represent increasingly ambitious post-pandemic policies to decarbonize transport. Surface freight includes road, rail and inland waterways. It does not include international maritime and airfreight. EEA, European Economic Area; LAC, Latin America and the Caribbean; MENA, Middle East and North Africa; SSA: sub-Saharan Africa. OECD Pacific includes Australia, Japan, New Zealand and the Republic of Korea. Transition economies include the former Soviet Union and non-EU South-Eastern Europe.

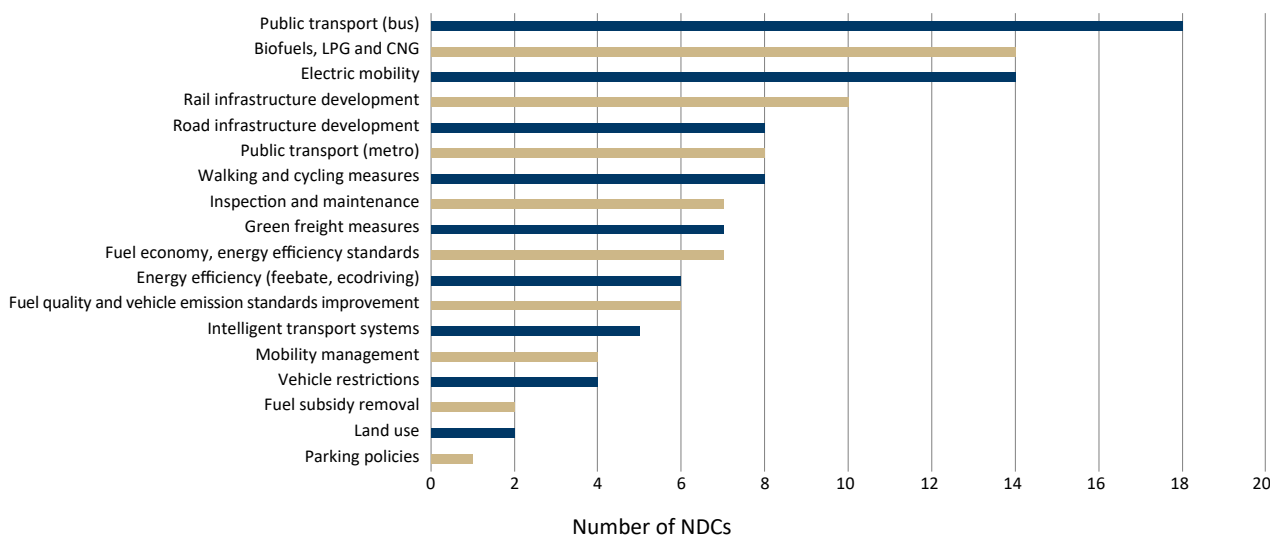
Amid growing transport demand and subsequent energy use, regional transport CO₂ emissions in Asia and the Pacific have increased by more than 200 per cent over the past three decades. The region's share of global transport emissions also increased, from 14 to 27 per cent between 1990 and 2018.¹⁴

Emerging initiatives

Integrating policies in nationally determined contributions

Ambitious low- or zero-carbon transport policies need to be implemented in Asia and the Pacific to guide the gradual transition of the sector to net-zero carbon. As countries in the region have different levels of transport infrastructure and motorization rates, policies chosen need to be context specific and respond to demand. Effective technological and regulatory solutions for urban passenger transport that can be drawn on already exist. On other hand, non-urban transport, including passenger and freight transport, will be more challenging to decarbonize.

Figure 3.3. Transport sector mitigation policies in nationally determined contributions



Source: United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP), “Using smart transport technologies to mitigate greenhouse gas emissions from the transport sector in Asia”. Available at www.unescap.org/resources/using-smart-transport-technologies-mitigate-greenhouse-gas-emissions-transport-sector-asia.

Note: The top three strategies listed in NDCs submitted by countries in Asia and the Pacific focus on the improvement of public bus transport, cleaner energy sources, such as natural gases and biofuels, and electric mobility.

Many countries in the region have already incorporated low- or zero-carbon transport policies into their transport masterplans or in NDCs. In most of them, however, the number, range and scale of such policies are insufficient to meet their climate goals and address the burgeoning demand for both passenger and freight transport. Some policies and practices, nonetheless, have been effective in regulating transport demand and reducing CO₂ emissions through changes in standards, regulations and technologies which the region can build upon. Integrating resilience transport concepts into planning, infrastructure design and operations is also necessary for the sector to be better prepared for increasing extreme weather conditions or another pandemic.

The value of transport infrastructure and network performance needs to be preserved through good maintenance, while accounting for temporary unavailability of services in continuity plans. Assessing the vulnerability of transport infrastructure and networks to climate change and extreme weather conditions and developing new decision tools that incorporate this uncertainty into asset appraisal¹⁵ is required.

Promoting low-transport neighbourhoods

The concept of integrated land use and transport planning with public transport and non-motorized transport development at its core has been applied in various cities throughout Asia and the Pacific. Its objective is to improve the sustainability of modal choices and reduce distances travelled by private vehicles in a city. Singapore has taken this concept further in its efforts to create 20-minute towns, where residents can access a range of services in 20 minutes or less.¹⁶ Public transport services can then be integrated with active mobility, such as walking, cycling and micromobility,¹⁷ and the accessibility of public services.

The integration of public transport and other transport modes increases the efficiency of transport networks and incentivizes the use of public transport. The Parañaque Integrated Terminal Exchange in Metro Manila is one example of an integrated and multi-modal terminal. It has departure and arrival bays for buses, jeepneys and taxis, facilitating the smooth transfer of passengers coming in and out of the city and reducing congestion in the city centre. An increasing number of cities have created or are planning integrated ticketing systems, as part of Mobility as a Service (MaaS) systems. Transport users can access integrated ticketing services using one single app in Australia, China, the Republic of Korea and Singapore.¹⁸

The integration of urban freight activities in cities will become increasingly critical to the development of low-carbon urban freight as demand continues to increase. In South-East Asia alone, urban freight is projected to nearly double between 2015 and 2030, and more than double again between 2030 and 2050.¹⁹ Efficient and low-carbon urban freight can be enhanced by providing dedicated trucking routes, parking facilities for loading and unloading of goods within cities and integrated logistics centres, and through the use of electric vehicles.²⁰ Low-carbon urban freight measures could reduce congestion, improve air quality and enhance the efficiency of road space allocation.

Improving fuel efficiency

Improving the fuel efficiency of motor vehicles is an effective way to reduce CO₂ emissions while the transition to electric vehicles is underway. Countries in South-East Asia have adopted the ASEAN Fuel Economy Roadmap for the Transport Sector 2018-2025, which focuses on light-duty vehicles. This road map includes a vision for transforming the light-duty vehicle market in the subregion into one of the world's most fuel efficient.²¹ It is focused on reducing the average fuel consumption of new light-duty vehicles sold in ASEAN by 26 per cent between 2015 and 2025.

The road map's six goals include several key policy recommendations. Among them are the development of a common labelling scheme, the deployment of common economic incentives or penalties to encourage vehicle fuel efficiency and the development of regulatory requirements on the average fuel economy of vehicles across ASEAN member States.²² Such policies should lead to the harmonization of fuel economy standards in the South-East Asia subregion and facilitate the transition to low- and zero-emission vehicles over time. Other countries in the Asia-Pacific region currently have fuel economy standards for light-duty vehicles are China, India, Japan and the Republic of Korea.

Electrification of road transport

The electrification of two- and three-wheel vehicles is increasing rapidly in Asia and the Pacific. Electric light-duty vehicle sales have also grown exponentially over the past 15 years, with China dominating the global market in terms of manufacturing and vehicle sales.²³ The electric bus market is also dominated by China, where there are approximately 600,000 electric buses, while the sales of electric buses in Japan, the Republic of Korea and India have also been increasing exponentially.²⁴

The success of electrification depends on policy interventions and technological advancement that reduce the total cost of owning an electric vehicle provide extended range and faster charging, and increase in the range of models. Several noteworthy initiatives have been taken. In India, schemes, such as the Faster Adoption and Manufacturing of Electric Vehicles, were introduced to support the development of the electric vehicle market.²⁵ Thailand has launched an electric vehicle policy, which is intended to accelerate the production of electric vehicles in the country so that 30 per cent of all vehicles made domestically are electric by 2030. This plan provides financial and fiscal incentives and safety standards for electric vehicles and battery manufacturers.

Reducing road freight transport emissions

Although setting the freight transport sector on a low-carbon pathway is more complex to achieve than for passenger transport, climate action for freight transport in urban and non-urban areas is being taken by some countries in the Asia-Pacific region. Bolder policy action, including placing freight transport higher up on the political agenda and providing optimal business cases for the private sector to act, is necessary to tackle growing freight emissions in the region.

Road freight is the second largest contributor to global transport CO₂ emissions after passenger road transport and has significantly higher emission levels than aviation, rail and marine bunkers combined.²⁶ Road transport accounts for 15 per cent of total freight activity and 44 per cent of global freight CO₂ emissions.²⁷ It is the main mode of transport for freight in most countries, including in Asia and the Pacific. Some of the policies that reduce road freight transport emissions are those that improve energy and vehicle efficiency and enhance the performance standards, such as tire rolling resistance, vehicle capacity, pricing and operational management.²⁸ Fuel efficiency standards for heavy-duty vehicles have been adopted by China, India Japan and the Republic of Korea, but they need to be adopted by more countries if the region is to meet the goals of the Paris Agreement.

A shift in freight from road to rail can support the transition to low-carbon transport. Rail consumes an equivalent of only one third of the fuel used by road transport.²⁹ Every ton-kilometre shifted from road vehicles to electrically powered rail could save 100 g of CO₂ annually.³⁰ An example of ambitious rail transport network expansion and electrification is the dedicated freight network of Indian Railways, which has the potential to create a net-zero carbon emission system.³¹ The dedicated corridors are expected to draw up to 70 per cent of the freight traffic of the existing network, implying almost 520 billion ton-kilometre per year saved from the existing network. Some lines are projected to reduce CO₂ emissions by up to six times compared to a business-as-usual scenario.

The electrification of rail transport may not, however, be a cost-effective solution for every country in the Asia-Pacific region. For countries where substantial capital investment in infrastructure is unavailable or where the volume of rail transport is limited and does not justify such investments, a rolling stock that uses alternative technologies or fuels, such as biodiesel or compressed natural gas (CNG), could be an option.

Harnessing new transport technologies

Increases in energy efficiency and electrification can reduce transport CO₂ emissions. Reductions can be even greater when combined with innovative passenger and freight transport technologies, such as passenger information systems, automatic toll payment, congestion charging, digitally enabled real-time route planners, and contactless and paperless border crossings.³² Many countries in the region are attempting to shift their traditional transport technologies to systems with greater automation. Investment in digital infrastructure would enhance the flexibility and agility of transport systems, but it needs to be coupled with enhanced information technology literacy and measures to overcome digital divides when developing relevant transport policies.³³

Innovative transport systems would not only reduce energy consumption and CO₂ emissions, but also reduce road congestion and air pollution, increase accessibility and ensure the smooth delivery of freight. The application of innovative transport technologies to public transport can be made more attractive through reduced waiting times and shorter journeys. When combined with integrated transport and land-use planning, greater transport efficiency could reduce travel distance, which lowers energy use and CO₂ emissions. Coupled with shared mobility, app-based mobility services have the potential to replace private vehicle use and reduce congestion and air pollution, while

enhancing accessibility and connectivity. Appropriate regulations are required to fully capture the potential benefits of app-based mobility shares.

Gender equality for low-carbon transport

Improving gender equality in transport could help put the sector on a low-carbon pathway and improve its resilience. The travel behaviour and patterns of women and men, their transport modes of choice, and the distances and time they travel differ, carry implications for transport CO₂ emissions.³⁴ These differences in travel behaviour are influenced by a variety of factors. Accessibility, safety and security, affordability, and convenience are key attributes women consider. In many cities, riding public transport during rush hour comes with the fear of sexual harassment for women and girls. The disproportionate amount of unpaid care and domestic work carried out by women in the Asia-Pacific region – more than four times that of men – limits the opportunities for women’s engagement in the labour market and their opportunities to access paid work.³⁵

Current transport services and infrastructure do not respond to women’s needs. Women already choose more sustainable modes, such as public transport and travel shorter distances in Asia and the Pacific. They tend to make more non-work-related trips, and travel more during off-peak hours.³⁶ Gender equality policies for women transport users could, therefore, include changes in public transport operations, such as scheduling, implementing safety regulations and technologies for public transport, taxi and informal transit services, and conducting gender analysis for transport policies. Gender equality in the transport workforce would contribute to a more sustainable and resilient transport sector. It could sharpen the focus on addressing climate change, responding to caring responsibilities, securing food and ensuring environmental sustainability.³⁷ This is especially critical in countries facing labour shortages in the transport sector and where recruitment should be extended to the whole labour market.

Gender equality must be integrated into policies designed to set the transport sector on a low-carbon pathway. Gender budgeting in transport is an effective instrument to ensure gender equality is considered in the allocation, planning and management of transport investments. This enables the different needs of women to be assessed and reflected in expenditure decisions. As the transport sector has long been male dominated, gender considerations are being overlooked, the participation and representation of women is needed in transport investment planning and design processes. This can then ensure that gender equality is effectively mainstreamed into policies and development programmes.

Building resilient transport infrastructure

Transport resilience policies are still not widely adopted in Asia and the Pacific. As countries in the region experience increasing extreme weather conditions, greater climate impact and other disruptions, policies to make transport infrastructure more resilient need to be developed and implemented. Adaptation has been mentioned in 86 per cent of NDCs, but only 16 per cent of them are related to transport, which focus on vulnerability assessments and infrastructure planning.³⁸

Greater focus on the education and training of the transport community on the importance of addressing climate change is key to accelerating adaptation. Top-level leadership needs to be sensitized so that it can provide clear policy direction in this regard. The development of climate change-focused partnerships across governance levels and with the private sector is needed to improve institutional capacity to identify synergies across policies and develop new funding strategies.³⁹ Integrating climate risk assessment analysis into transport planning and infrastructure design

processes would help to prioritize adaptation efforts based on potential consequences.⁴⁰ Resilience-based transport system planning accepts asset failure as a possible consequence of climate change and focuses on minimizing the consequences of assets becoming unavailable.

Strengthening regional cooperation

Regional cooperation through the exchange of best practices, information and relevant data would support efforts of countries in Asia and the Pacific to align their low-carbon transport policies to achieve their climate goals. Countries are at varying stages of introducing new transport technologies and would benefit from sharing their experiences on how to best roll them out.⁴¹ Countries that share similar cultural, climatic or topographical characteristics can learn from one another on the adaptation of new and emerging transport services, technologies and regulatory frameworks. With this goal in mind, ESCAP launched two initiatives in 2022: the Regional Cooperation Mechanism on Low Carbon Transport; and the Asia-Pacific Initiative on Electric Mobility. Both are aimed at enhancing regional collaboration among countries and different stakeholder groups.

The Regional Cooperation Mechanism on Low Carbon Transport promotes low-carbon transport, including the shift to electric mobility and clean energy technologies, to contribute towards the reduction of transport emissions. It helps ESCAP member States identify and develop policies covering low-carbon mobility, clean energy technologies and logistics. The mechanism complements existing intergovernmental processes for transport and accelerates collaborative efforts related to low-carbon transport among countries. The outputs of the Regional Cooperation Mechanism will contribute to the development of high-level regional dialogues and initiatives on transport and climate change.

The Asia-Pacific Initiative on Electric Mobility supports developing countries in the Asia-Pacific region by providing expertise and technological know-how, and identifying financial means to transition to net-zero carbon transport. This initiative supports the transition to electric mobility in the region by enhancing regional cooperation, peer learning and experience-sharing among private and public sector stakeholders. It aims to strengthen countries' capacity to formulate national strategies to accelerate the transition towards electric mobility, focusing on public transport fleets, enhancing multisectoral collaboration and developing a knowledge base on the electric mobility ecosystem in the region. Policy development and capacity-building support will be provided to specific countries upon request in 2023, and an electric mobility training course will be developed to increase policymakers' technical knowledge of relevant policy frameworks.

To better serve the research needs of countries in the Asia-Pacific region and bridge the gap between the scientific community and national governments, ESCAP launched the Transport Research and Education Network at the fourth Ministerial Conference on Transport, held in Bangkok from 17 to 21 December 2021. This network presents policymakers and research, education and training institutes with the opportunity to exchange information research and training needs related to sustainable transport. Focusing on the following thematic areas: transport connectivity and regional integration; sustainable transport systems and services; climate action in transport; and safe and inclusive transport and mobility, it will support ESCAP member States in their efforts to meet their commitments to the Paris Agreement and realize the Sustainable Development Goals through education and training, and increased access to research and analysis.

ENDNOTES

- 1 International Energy Agency (IEA), *Transport* (Paris, 2022).
- 2 Ibid.
- 3 Ibid.
- 4 International Transport Forum, *ITF Transport Outlook 2021* (Paris, OECD Publishing, 2021).

- 5 Council for Decarbonising Transport in Asia, *The Path to Zero: a Vision for Decarbonised Transport in Asia – Overcoming Blind Spots and Enabling Change* (NDC Transport Initiative for Asia, 2022). Available at <https://changing-transport.org/publications/ndctia-council-the-path-to-zero/>.
- 6 Sudhir Gota and Cornie Huizenga, *Asian Transport 2030 Outlook* (Manila, ADB, 2022).
- 7 ITF, *ITF Transport Outlook 2021*.
- 8 International Transport Forum, “Transport Climate Action Directory”. Available at <https://itf-oecd.org/tcad>.
- 9 ITF, *ITF Transport Outlook 2021* (see chap. 3, table 3.1).
- 10 Asian Development Bank (ADB), *Reimagining the Future of Transport Across Asia and the Pacific* (Manila, 2022).
- 11 Ibid.
- 12 International Transport Forum, *ITF Transport Outlook 2019* (Paris, OECD Publishing, 2019).
- 13 ITF, *ITF Transport Outlook 2021* (see chap. 3, table 3.1).
- 14 ADB, *Reimagining the Future of Transport Across Asia and the Pacific* (see chap. 3, footnote 10).
- 15 International Transport Forum (ITF), *Adapting Transport to Climate Change and Extreme Weather: Implications for Infrastructure Owners and Network Managers* (Paris, OECD Publishing, 2016).
- 16 Union Internationale des Transports Publics, *Urban Mobility Innovation Index 2021* (2021). Available at <https://uitp.org/publications/urban-mobility-innovation-index-2021/>.
- 17 *Review of Developments in Transport in Asia and the Pacific: Towards Sustainable, Inclusive and Resilient Urban Passenger Transport in Asian Cities*. (United Nations publication, 2021).
- 18 Ibid.
- 19 International Transport Forum, “ITF Southeast Asia transport outlook”, International Transport Forum Policy Papers, No. 103 (Paris, OECD Publishing, 2022). Available at <https://itf-oecd.org/itf-southeast-asia-transport-outlook>.
- 20 Michael Browne and Jullian Allen, “Enhancing the sustainability of urban freight transport and logistics”, *Transport and Communications Bulletin for Asia and the Pacific*, No. 80 (2011), pp. 1-19.
- 21 Association of South East Asian Nations, *Fuel Economy Roadmap for the Transport Sector 2018-2025: With Focus on Light-Duty Vehicles* (Jakarta, ASEAN secretariat, 2019).
- 22 International Transport Forum, “Implementing the ASEAN Fuel Economy Roadmap”, International Transport Forum Policy Papers, No. 102 (Paris, OECD Publishing, 2022).
- 23 International Energy Agency, *Global EV Outlook 2022* (Paris, 2022).
- 24 Ibid.
- 25 *Review of Developments in Transport in Asia and the Pacific: Towards Sustainable, Inclusive and Resilient Urban Passenger Transport in Asian Cities* (see chap. 3, footnote 17).
- 26 ITF, *ITF Transport Outlook 2021* (see chap. 3, table 3.1).
- 27 Ibid.
- 28 Alan McKinnon, “The economic and environmental benefits of increasing maximum truck weight: the British experience”, *Transportation Research Part D: Transport and Environment*, vol. 10, No. 1 (2005), pp. 77-95.
- 29 Alexander Burrows and Marcelo Blumenfeld, “Decarbonising rail transport in ESCAP region: challenges and way ahead”, presentation. May 2021. Available at https://unescap.org/sites/default/d8files/event-documents/1_Rail%20Decarbonisation%20Presentation%20AB%20MB%20May21.pdf.
- 30 *Review of Developments in Transport in Asia and the Pacific: Towards Sustainable, Inclusive and Resilient Urban Passenger Transport in Asian Cities* (see chap. 3, footnote 17).
- 31 Ibid.
- 32 Ibid.
- 33 Nafis Anwari and others, “Exploring the travel behavior changes caused by the COVID-19 crisis: a case study for a developing country”, *Transportation Research Interdisciplinary Perspectives*, vol. 9 (March 2021).
- 34 Marlon G. Boarnet and Sharon Sarmiento, “Can land-use policy really affect travel behaviour? A study of the link between non-work travel and land-use characteristics”, *Urban Studies*, vol. 35, No. 7 (1998), pp. 1155-1169.
- 35 Asian Development Bank and UN Women, “Gender Responsive Budgeting in Viet Nam: General Equality in Transport”, policy brief, 2019).
- 36 Wei-Shiuen Ng and Ashley Acker, “Understanding urban travel behaviour by gender for efficient and equitable transport policies”, International Transport Forum Discussion Paper, No. 2018-01 (Paris, OECD Publishing, 2018).
- 37 Annica Kronsell, Lena S. Rosqvist and Lena W. Hiselius, “Achieving climate objectives in transport policy by including women and challenging gender norms: the Swedish case”, *International Journal of Sustainable Transportation*, vol. 10, No. 8 (December 2015), pp. 703-711.
- 38 *Review of Developments in Transport in Asia and the Pacific: Towards Sustainable, Inclusive and Resilient Urban Passenger Transport in Asian Cities* (see chap. 3, footnote 17).
- 39 Steve Winkelman, Charles Kooshian and Alison Booshins, “Integrated state and local government policy approaches to transportation and climate change: a summary of the executive peer exchange”, Woods Hole, Massachusetts, 9–10 September 2009. Available at [https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36\(94\)_FR.pdf](https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36(94)_FR.pdf).
- 40 ITF, *Adapting Transport in Climate Change and Extreme Weather* (see chap. 3, footnote 15).
- 41 *Review of Developments in Transport in Asia and the Pacific: Towards Sustainable, Inclusive and Resilient Urban Passenger Transport in Asian Cities* (see chap. 3, footnote 17).

CHAPTER 4

BUILDING LOW-CARBON INDUSTRIES THROUGH CLIMATE-SMART TRADE AND INVESTMENT

Manufacturing and construction

More than one third of the region's greenhouse gas emissions come from the generation of electricity and heat.¹ If those emissions are accounted for in the sectors in which the energy is consumed, manufacturing and construction are the largest sources of CO₂ emissions. In global value chains, the region accounts for approximately 75 per cent of emissions in manufacturing and construction. Renewable energy is, therefore, needed to reduce CO₂ emissions from the manufacturing and construction sectors and major structural change is necessary to replace employment in old industries with that in new sectors. Policies to facilitate the transition and cushion the impact on vulnerable groups are required to achieve a just transition.

International trade and investment allow for the most efficient use of productive resources and can maximize economic prosperity. However, the absence of a global set of environmental regulations, trade and investment that supports the transfer of production around the world can hinder the transition to a low-carbon pathway. A global framework is, therefore, critical. Equally, trade-related transportation emissions need to be reduced by introducing energy efficient modes of transport and switching to low-carbon fuels. As the largest portion of pollution comes from the production process, trade and investment need to play a critical role in the transfer, manufacture and diffusion of green technologies so that production of goods can be less detrimental to the environment.

Despite the Asia-Pacific region being known as the factory of the world, in recent years, the primary source of growing emissions has been the increase in domestic consumption, which is linked to rising living standards. Considering the urgent need for economies in the region to reduce their production-based greenhouse gas emissions, converting to lesser-emitting production technology is essential and would contribute towards building substantiable smart-trade competitiveness. This is likely to provide a great advantage, as major trading partners, such as the European Union, are introducing policies that are intended to equalize the costs of setting economies on low-carbon pathways across borders.

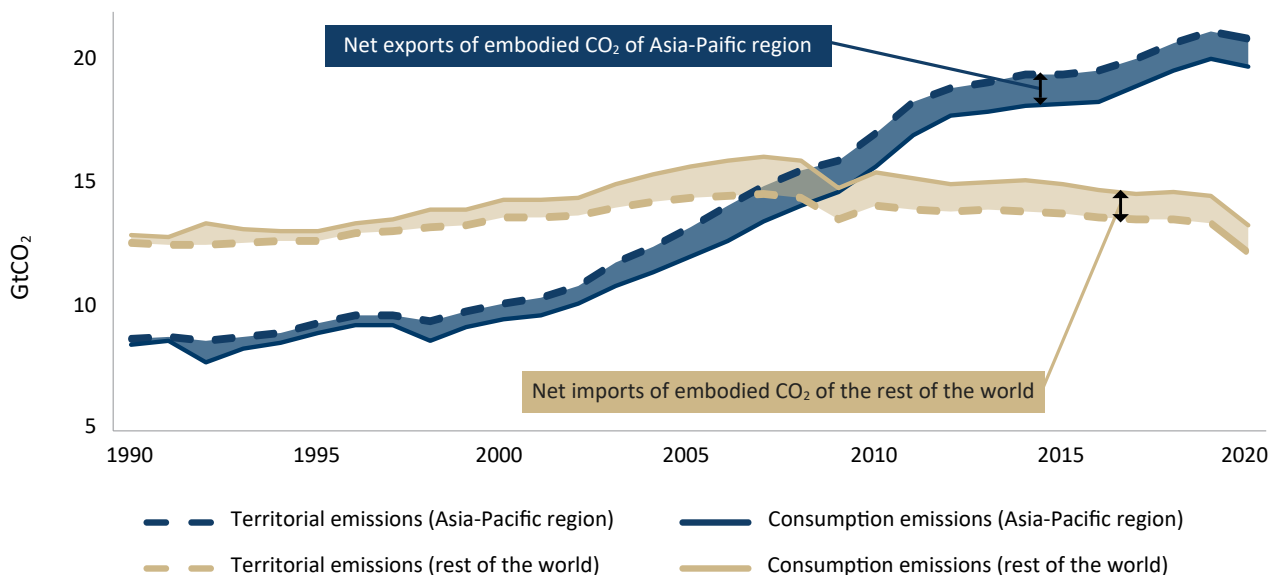
Asia and the Pacific: exporter of carbon-intensive goods

Greenhouse gas emission accounting is typically done at the point of production. Yet international trade means the consumption of goods is jurisdictionally removed from the point of production. To obtain a complete picture of the sources of emissions, it is necessary to account for both production and consumption. Taking into account only the production through territorial emissions obscures nuances important for effective climate-smart policymaking.

Total emissions in the rest of the world had somewhat plateaued and then started to decline at the height of the COVID-19 crisis. Nevertheless, the gap between consumption and production emissions has widened, signifying a significant leakage of greenhouse gas from the rest of the world to the Asia-Pacific region. The increase in emissions in the region has accelerated significantly since the late 1990s, overtaking the rest of the world after the 2008–2009 global financial crises.² Although

the gap between consumption and territorial emissions remains high, it accounts for a relatively small share of the increase in emissions. As already noted, the bulk of the increase in greenhouse gas emissions in the region is the result of greater consumption linked to economic development, rather than from manufactured products destined for developed markets.

Figure 4.1. Territorial and consumption emissions in the Asia-Pacific region



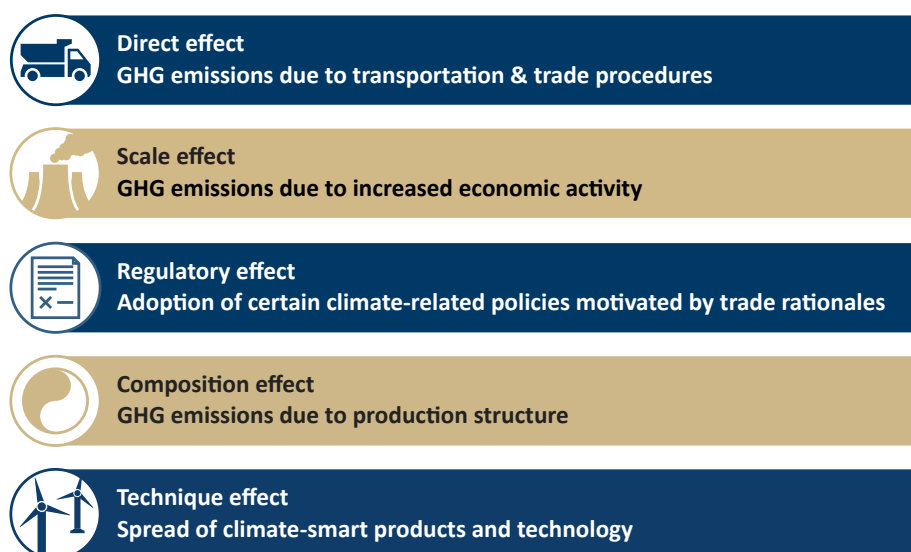
Sources: ESCAP calculations based on data from Pierre Friedlingstein and others, “Global carbon budget 2022”, *Earth System Science Data*, vol. 14, No. 11 (2022), pp. 4811-4900; and World Bank, World Development Indicators. Available at <https://databank.worldbank.org/reports.aspx?source=World-Development-Indicators>.

Carbon leakages (production displaced from countries with stringent environmental policies to countries with more lenient requirements) and differences in carbon pricing between countries are nevertheless likely to remain topical. Large climate action policy champions, such as the European Union, are implementing more stringent carbon-pricing policies and other countries are increasing their emission reduction commitments. Such initiatives are important as unaddressed, carbon-pricing policies can increase emissions if cleaner producers are substituted for cheaper but more polluting and less regulated producers overseas.³ Carbon border adjustment tariffs aim to stop such leakages and improve domestic competitiveness. Intelligently designed border adjustment mechanisms can achieve this goal, but the consequences for some subregions of Asia and the Pacific will be greater than for others.

Trade and investment to combat climate change

Considering the region’s exports of manufactured goods and investment in manufacturing industries, making trade and investment become more climate smart in Asia and the Pacific is essential to combat climate change. Climate-smart trade and investment policies are defined as all government regulations aiming to reduce or limit net greenhouse gas emissions that can affect foreign trade and investment. Eliminating fossil fuel subsidies and establishing carbon pricing mechanisms are among the main policies that internalize the environmental costs of greenhouse gas emissions. Other climate-smart trade and investment policies include liberalizing trade in environmental goods and services, addressing cross-border trade inefficiencies, setting emissions standards for imports, implementing non-tariff measures (NTMs), and addressing other wasteful subsidies.

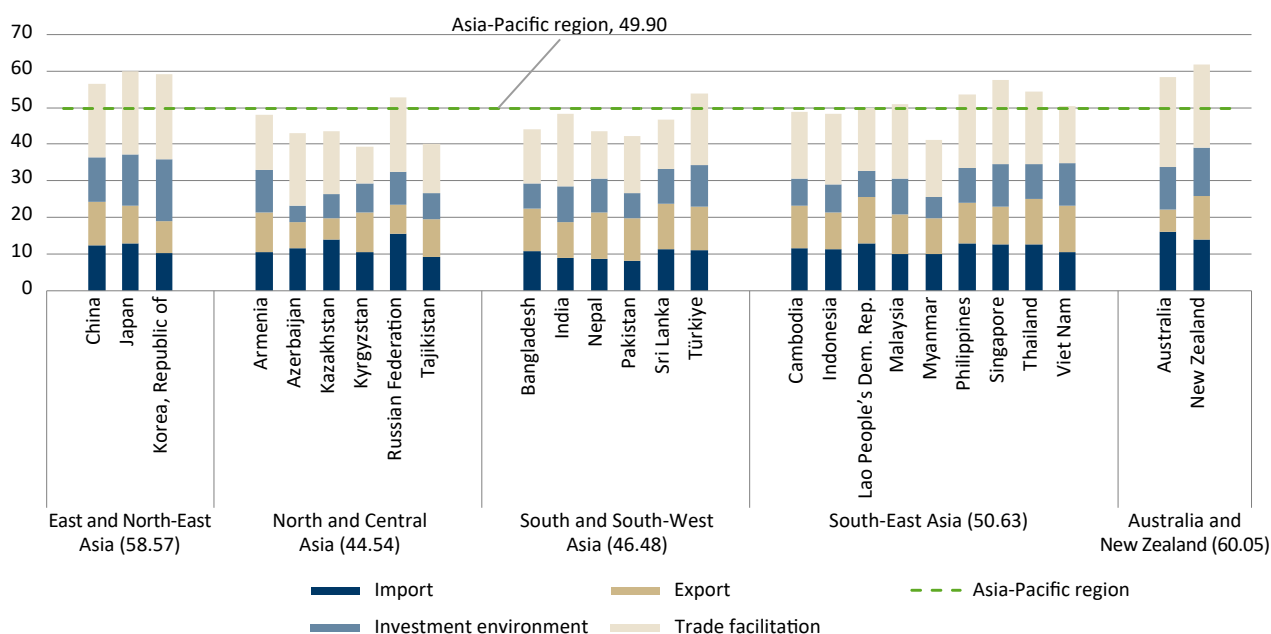
Figure 4.2. Effects of trade and investment on greenhouse gas emissions



Source: *Asia-Pacific Trade and Investment Report 2021: Accelerating Climate-smart Trade and Investment for Sustainable Development* (United Nations Publication, 2021).

All economies in the region can make their trade and investments more climate-smart. Barriers to trade in environmental goods, which include technologies vital for climate action, such as solar panels and wind turbines, are more prevalent than barriers to trade in carbon-intensive fossil fuels. In 16 out of 26 economies examined in the Asia-Pacific region, the average applied tariffs on carbon-intensive fossil fuels are lower than those on environmental goods.⁴ Apart from a few notable exceptions, such as Japan, Kyrgyzstan, the Lao People’s Democratic Republic, the Philippines and Nepal, 21 out of the 26 economies examined are imposing more non-technical NTMs on imports of environmental goods than on imports of carbon-intensive fossil fuels.

Figure 4.3. Climate-smart trade and investment index score in Asia and the Pacific, 2019



Source: *Asia-Pacific Trade and Investment Report 2021* (see chap. 4, figure 4.2).

While many countries in the region have set mandatory emissions standards on imports of vehicles, require energy ratings labels and ban trade in chlorofluorocarbons (the gaseous compounds most responsible for stratospheric ozone depletion), more should consider doing so. Additional steps are also needed to combat trade in illegal timber, which contributes towards large-scale deforestation. Mandatory requirements of climate-friendly production processes may run contrary to the current non-discriminatory principles of the World Trade Organization (WTO) agreements, which are based on product features and not the features of the production processes. In such cases, voluntary eco-labelling could be used instead of imposing NTMs.

On average, Asia-Pacific economies have increased the share of carbon-intensive fossil fuels in their trade since 2015.⁵ Wasteful and regressive fossil fuel subsidies continue to contribute to greenhouse gas emissions in the region. Their timely abolishment – and importantly replacement – with more targeted support policies, could provide much-needed finance for social and environmental policies in addition to resulting in the reduction in emissions.

Trade facilitation measures could result in reduced greenhouse gas intensity of trade. The link between trade facilitation and climate change is not well recognized. Existing multilateral and regional trade facilitation agreements fail to exploit the potential synergies between trade facilitation and climate change efforts. Trade facilitation can make the trade transaction process less carbon intensive.

Digital trade facilitation, such as the implementation of automated customs and paperless trade systems, can contribute significantly towards reducing CO₂ emissions.⁶ ESCAP research shows the emissions saved by fully digitalizing a single end-to-end trade transaction are equivalent to planting 1.5 trees.⁷ For Asia and the Pacific, this implies savings of approximately 13 million tons of CO₂ annually, equivalent to the carbon absorbed by 400 million trees. These results are driven by efficiency gains from handling data digitally.⁸

Green shipping

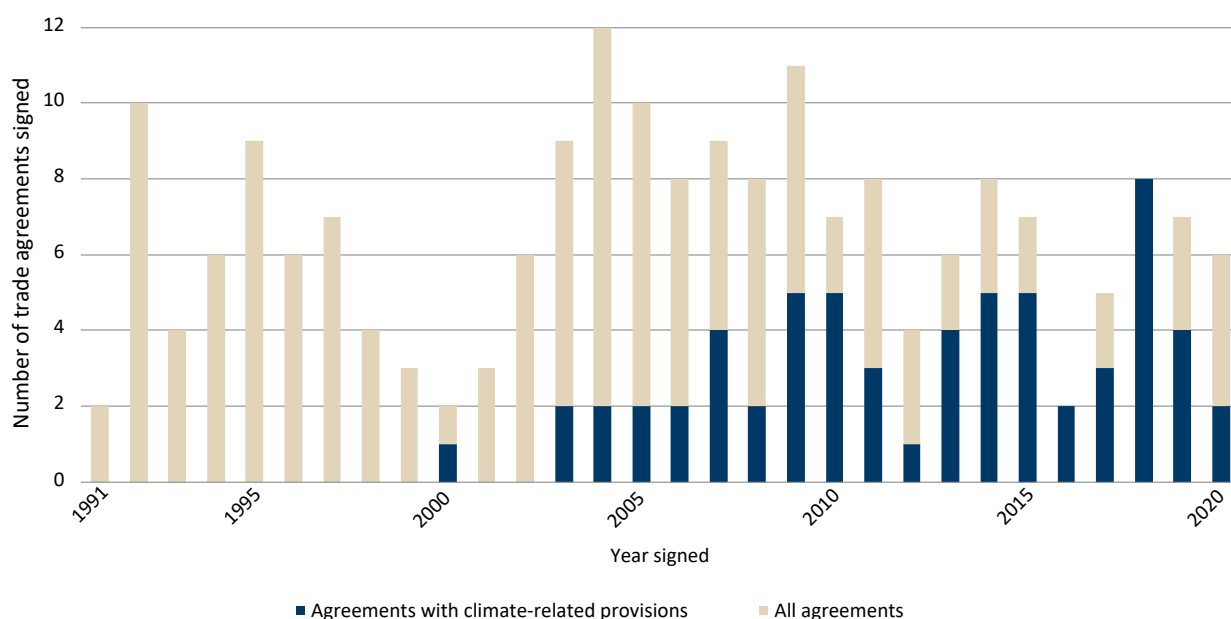
An increase in trade volume by more efficient trade facilitation should not be accompanied by an increase in greenhouse gas emissions from international shipping, which accounts for 3 per cent of global CO₂ emissions. Measures to reduce greenhouse gas emissions from international shipping can largely be divided into three interconnected categories: (a) International Maritime Organization (IMO) measures to achieve the 50 per cent reduction target of greenhouse gas emissions from international shipping by 2050; (b) multilateral and bilateral cooperation measures, such as the Clydebank Declaration and the concept behind a green shipping corridor; and (c) technical measures to support the transition to lower carbon intensity fuels (liquefied natural gas (LNG), liquified petroleum gas (LPG), biofuel, ammonia, methanol, ethane and hydrogen) and application of ship building and navigation technologies.

Green shipping, which aims to achieve low-carbon and net-zero emissions, is the most urgent and important agenda item in the shipping and port sector in the region. At the UNFCCC COP26, a total of 24 countries, including 11 ESCAP member States, signed the Clydebank Declaration, pledging to act collectively to demonstrate the viability of multiple green shipping corridors by 2025. These are maritime routes that demonstrates low-emission and zero-emission life-cycle fuels and technologies with the ambition to achieve zero greenhouse gas emissions across on all aspects of the corridor and support sector-wide decarbonization no later than 2050. At COP27, the green shipping corridor was further expanded to include cooperation from all stakeholders, such as port cities, shipowners, shipping companies, marine fuel producers, regulatory agencies, shipbuilding and financial institutions.

Promoting regional trade agreements to support climate action

Regional trade agreements (RTAs) typically go beyond commitments made under WTO agreements, making them suitable for dealing with environmental issues, including climate change. There is a general trend towards including a higher number of environmental provisions in RTAs, broadening their scope and deepening their stringency. The vast majority – 85 per cent – of RTAs signed after 2005 to which at least one Asia-Pacific economy was party contain one or more climate-related provisions. The agreements with the most climate-related articles that include an Asia-Pacific economy most often involve the European Union, the Republic of Korea and Japan. Empirical evidence of the impact of environmental provisions in RTAs is minimal, but it suggests that they do not substantially reduce exports from developing countries, but they promote green exports.

Figure 4.4. Climate-related provisions in trade agreements



Source: *Asia-Pacific Trade and Investment Report 2021* (see chap. 4, figure 4.2).

Most of the climate-related articles in Asia-Pacific RTAs relate to climate action (34 per cent), environmental goods, services and technologies (27 per cent), sustainable energy (20 per cent) and greenhouse gas emissions (17 per cent). Very few refer to fossil fuel subsidies or carbon tax and carbon market mechanisms. The scope and specificity of climate-related provisions varies significantly across agreements. Most climate-related provisions include soft language, such as statements of intent reaffirming commitments made elsewhere or provide a broad basis for cooperation. Others, such as the Peru-Republic of Korea RTA, incorporate commitments to adopt policies and measures and specify concrete examples.

Commitments in RTAs to reduce tariff and non-tariff barriers to trade on environmental goods and services is a good starting point, as is expanding the list of goods from which the liberalization could deliver significant climate benefits. This would include goods not featured in the list of environmental goods agreed by the Asia-Pacific Economic Cooperation (APEC) in 2012, such as certain hydropower-related products. Particular attention should be placed on trade in services related to climate change, as they complement trade in environmental goods. RTAs should incorporate binding commitments on environmentally harmful subsidies, including fossil fuel subsidies. The New Zealand-European Union RTA under negotiation specifically addresses subsidies that negatively affect competition or trade, or harm the environment.⁹

Advancing climate-smart foreign direct investment

Foreign direct investment (FDI) can help mitigate greenhouse gas emissions. Foreign investors can back projects that reduce emissions and use clean technology. They can support climate-friendly sectors, such as renewable energy, and water and waste management, or the conservation and efficient use of natural resources. Foreign investment can contribute towards decarbonizing some of the largest emitting sectors by integrating digital technologies to manage and distributing resources more efficiently.

Despite these opportunities, greenfield investment in climate mitigation and climate adaptation have declined in recent years. The value and volume of climate mitigation projects have been significantly larger than climate adaptation projects. FDI focused on climate mitigation has been directed to renewable energy and other energy efficiency projects. The value and volume of climate adaptation projects have been low in the region, and largely focused on introducing clean technologies into foreign operations. Over the period 2016–2018, a total 1,218 climate mitigation projects worth \$247 billion were implemented compared to 83 climate adaptation projects worth \$2.7 billion.¹⁰

Foreign direct investment in climate mitigation and adaptation has been unevenly distributed across Asia and the Pacific. Developed countries and large developing countries receive the largest share of investments. Australia has been the top destination for climate mitigation FDI since 2011, followed closely by India and China (figure 4.5a). China has been the top destination for climate adaptation projects since 2011, with Viet Nam and Australia a distant second and third (figure 4.5b). Notably, no least developed countries nor small island developing States, arguably two sets of countries urgently in need of climate FDI, has received climate mitigation and adaptation FDI since 2011.

Figure 4.5a. Foreign direct investment in climate mitigation in Asia and the Pacific, 2011-2022

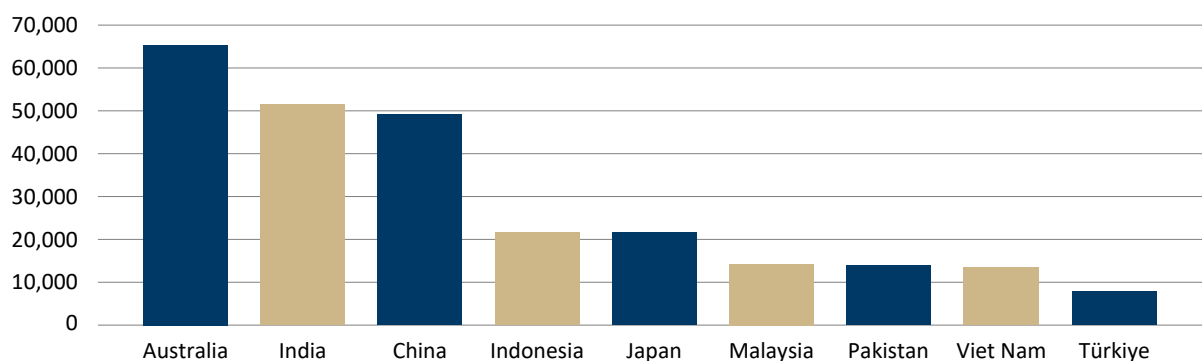
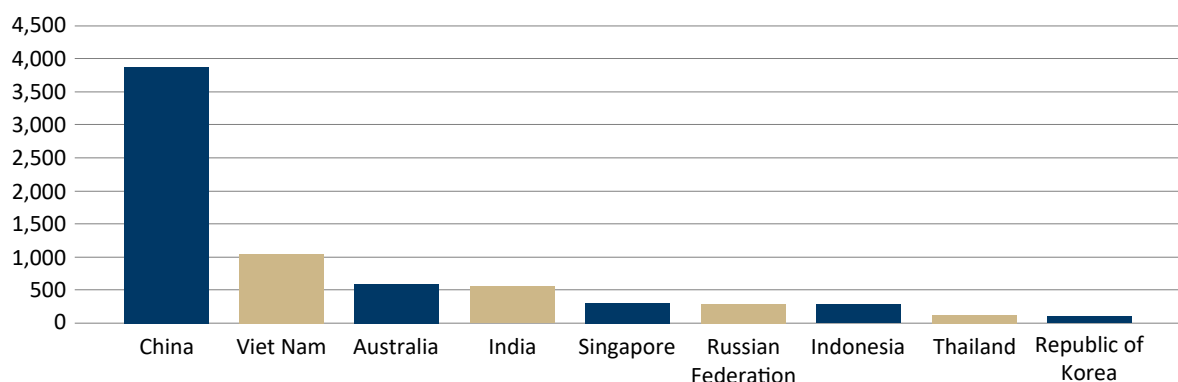


Figure 4.5b. Foreign direct investment in climate adaptation in Asia and the Pacific, 2011-2022



The low uneven distribution of FDI in the region underscores the urgent need to bring this type of investment into broader conversations on unlocking climate finance for developing countries. FDI has immense potential to help developing countries fill climate finance gaps, which has until now been left out of the discussions at forums on climate finance. While the most recent COP27 focused on ways to increase climate finance to developing countries, none of the decisions reference FDI as a potential source of climate finance. Many of these decisions¹¹ assume that climate finance and investment refer only to public sources of funding and multilateral development banks. It should be noted, however, that FDI can complement public funds as an important source of investment “to assist developing countries that are particularly vulnerable to the adverse effects of climate change”.¹²

There is an urgent need to support these developing countries, especially least developed countries and small island developing States, and their investment promotion agencies, in attracting and facilitating climate FDI. They need support in identifying the climate projects in which their countries would have a competitive advantage in attracting funds, targeting investors and pitching investment opportunities to foreign investors. This includes support for presenting and developing information to pitch at relevant climate and sustainable development finance forums and showcasing on investment project opportunities websites. Improving the capacity of investment promotion agencies to articulate to relevant ministries the need for incentives for climate FDI and to phase out fossil fuel subsidies is also critical. Beyond this, incorporating the ESCAP's sustainable FDI indicators into investment approval and monitoring and evaluation frameworks can help better enable investment promotion agencies and countries more broadly to assess, evaluate and measure the climate relevant characteristics of investments they attract. Several countries in the region have successfully incorporated these indicators into their investment monitoring and evaluation processes, including Invest Bhutan and the Board of Investment in the Philippines.

Private sector emission reduction targets

Over the past few years, a host of global campaigns and initiatives have been initiated to rally company action on climate (table 4.1). At the most ambitious level, some initiatives commit companies to halve emissions by 2030 and achieve net-zero emissions by 2050, in line with the emission reduction trajectories required to reach the goals of the Paris Agreement. These initiatives can help companies advance climate action through the transparency, screening and support provided. The public nature of the commitments can help maintain ambitious actions.

The Science-based Targets initiative (SBTi) has quickly expanded to become one of the more important initiatives driving corporate climate mitigation. The initiative invites companies to set emission reduction targets aligned with what is required to achieve a 1.5°C trajectory, provides a system to validate the targets before approval and requires annual reporting of progress towards achieving the targets.

By mid-2021, more than 1,600 companies, with a combined market capitalization of \$20.5 trillion, equivalent to 20 per cent of global GDP, have committed to SBTi. More than 800 of them have developed detailed targets and had them approved by the initiative; 641 of the set targets are in line with a 1.5°C trajectory. More than 300 signatories are from Asia and the Pacific, mostly from Japan and India. Of the Asian signatories, 69 have set targets that are in line with the 1.5°C trajectory. SBTi has found that companies that set science-based targets have reduced their combined emissions by 25 per cent since 2015, compared to an average increase of 3.4 per cent in global emissions from energy and industrial processes.¹³

Table 4.1. Key initiatives of private sector for climate action

| Initiative | Led by | Focus |
|---|--|---|
| Race to Zero | UNFCCC, Climate Pledge, B Corp Climate Collective, and the Exponential Roadmap initiative | Mobilizes a coalition of net-zero initiatives representing regions, cities, companies, universities, and investors, which cover 15 per cent of the global economy |
| Business Ambition for 1.5 degrees – Our Only Future | United Nations Global Compact, Science Based Target initiative (SBTi), Climate Disclosure Project (CDP) and the We Mean Business coalition | Campaign inviting corporate leaders to commit their companies to the 1.5°C target |
| We Mean Business coalition | World Business Council for Sustainable Development (WBCSD), CDP, BSR, Climate Group, the B team and Ceres | A global non-profit coalition working with some of the world’s most influential businesses to act on climate change |
| Science-Based Targets initiative | CDP, United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF) | Companies commit to set targets for emissions reductions to achieve the 1.5°C target or well below 2°C trajectory |
| Climate Neutral Now | UNFCCC | Invites organizations, governments and citizens to commit to climate neutrality |
| RE100, EP100 and EV100 | The Climate Group with CDP | RE100 requires members to set a timetable for realizing 100 per cent renewable electricity use by 2050 |
| Climate Action 100+ | Asia Investor Group on Climate Change (AIGCC), Ceres, Investor Group on Climate Change (IGCC), Institutional Investors Group on Climate Change and Principles for Responsible Investment (PRI) | Global investor coalition of more than 575 investors with \$54 trillion in assets under management aiming to improve the climate performance of large emitters with strong corporate emissions reduction strategies |

Source: *Asia-Pacific Trade and Investment Report 2021* (see chap. 4, figure 4.2).

Another notable initiative is Climate Action 100+, a global investor coalition comprised of more than 575 investors, with \$54 trillion in assets under management. It aims to leverage the power of global investors to ensure the largest global greenhouse gas emitting corporates take necessary action on climate change. Climate Action 100+ engages with 167 “systemically important” enterprises, which account for 80 per cent of annual global industrial emissions, alongside other companies, offering a significant opportunity to drive the clean energy transition. It asks signatories to influence and work with at least one of the 167 key enterprises to increase disclosure of climate change risks and put in place strong corporate emissions reduction strategies.

Table 4.2. Overview of sustainability disclosure frameworks

| Standard/framework | Description |
|---|--|
| GHG Protocol | The most widely used greenhouse gas accounting standards, used in many disclosure frameworks |
| GRI standards | Enable companies to report sustainability information that describes their contribution to sustainable development |
| Climate Disclosure Standards Board (CDSB) | A consortium of business and environmental non-governmental organizations launched to develop a global corporate reporting model on climate change and natural capital information, and financial capital information |
| Sustainability Accounting Standards Board (SASB) | SASB develops and maintains sustainability accounting standards, which help public corporations disclose material information to investors |
| International Integrated Reporting Council (IIRC) Integrated Reporting (IR) framework | The Integrated Reporting (IR) framework of IIRC promotes integrated reporting connecting an organization’s strategy, governance, performance and prospects |
| Task Force on Climate-related Financial Disclosures (TCFD) | TCFD developed a reporting framework for providing transparency about companies’ climate-related risk exposures to investors, lenders and insurance underwriters |
| CDP (formerly the Carbon Disclosure Project) | CDP operates a worldwide disclosure system for investors, enterprises, cities, states and regions, with a focus on carbon emissions, water and forests, aimed at providing the investment community with quality, consistent, comparable and TCFD-aligned data |

Source: CDP, Global Reporting Initiative and Climate Disclosure Standards Board, “Statement of Intent to Work Together Towards Comprehensive Corporate Reporting”, 11 September 2020. Available at www.integratedreporting.org/resource/statement-of-intent-to-work-together-towards-comprehensive-corporate-reporting/.

Sustainability in responsible business conduct

For many years, companies have been integrating sustainability into their management systems, guided by international standards and frameworks for responsible business conduct, such as the United Nations Global Compact, the OECD Guidelines and ISO 26000. While these frameworks have been in existence for two decades, their uptake in the region has risen significantly in recent years. The number of companies issuing sustainability reports has dramatically increased, with many of them measuring and accounting for greenhouse gas emissions as part of their reporting. Efforts to reduce energy consumption among businesses have become more frequent, as companies realize the strong business case from many energy-efficiency investments. A growing number of companies have committed publicly to achieving net-zero emissions by 2050, with some setting emission reduction targets that are aligned with what scientists believe is needed to limit global warming to 1.5°C.

Many companies have introduced an internal carbon price, which is used to reduce dependency on fossil fuels and incorporate carbon costs into procurement and investment decisions. The carbon price increases companies' resource productivity and enables them to retain budgets to invest in energy-saving and low-carbon technologies, as well as to prepare for carbon regulatory policies.¹⁴ According to recent Carbon Disclosure Project (CDP) data, the use of internal carbon pricing rose by 80 per cent over the past five years. More than 2,000 companies disclosed current or planned use of internal carbon pricing to CDP in 2020. With a combined market capitalization exceeding \$27 trillion, this represents a significant increase from \$7 trillion in 2017. Nearly half of the world's 500 biggest companies by market capitalization are now putting a price on carbon or planning to within two years. In the Asia-Pacific region, the largest increase in carbon pricing occurred over the past few years, making it the leading region in this regard, with a total of 796 Asian companies using or planning to use an internal carbon price, compared to 661 companies in Europe.¹⁵

Trade policies for regional climate action

Climate policies implemented outside of the region will affect economies in Asia and the Pacific. The region needs to prepare for actions taken by trading partners. For example, the European Union plans to introduce carbon border tax adjustments (BTAs) to combat carbon leakage and retain competitiveness. The European Union Carbon Border Adjustment Mechanism (CBAM) will affect a number of sectors, such as cement, iron and steel, aluminum, fertilizers, electricity and hydrogen. ESCAP modelling suggests BTAs are effective in stopping carbon leakages. The increases in emissions in least developed countries expected to be exempt from EU+ BTAs are relatively small, totaling less than 0.5 MtCO₂, suggesting the environmental impact of excluding them is relatively low.

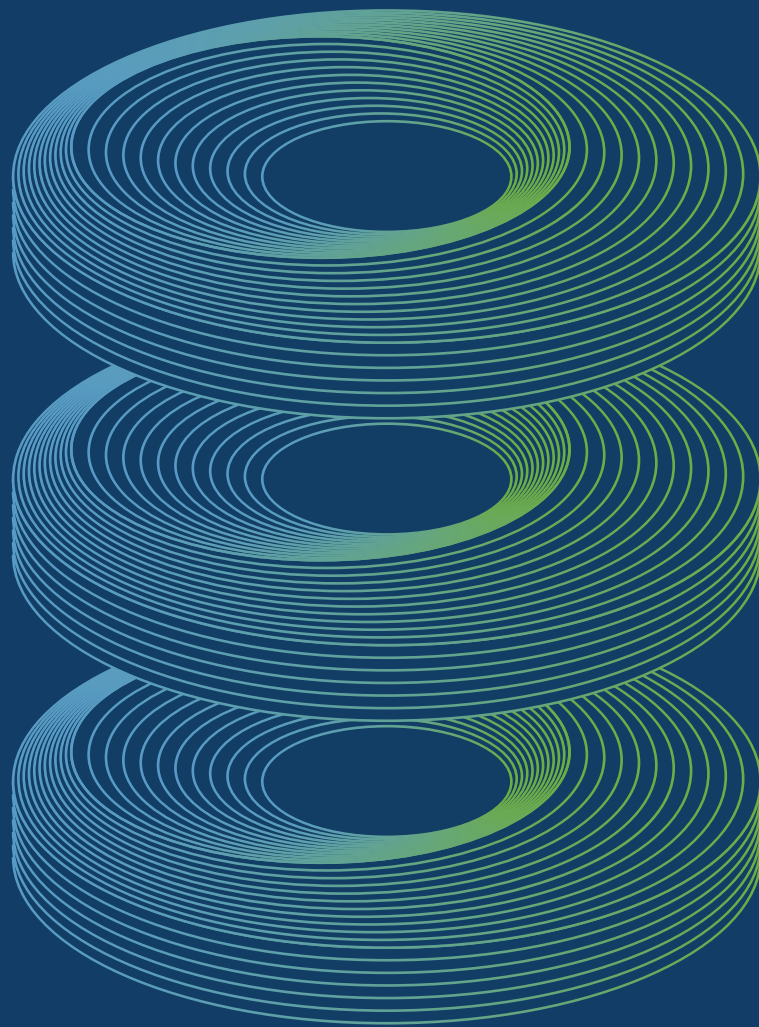
Modelling conducted by ESCAP indicates that exporters in East and North-East Asia and South and South-West Asia will experience declines in real exports because of CBAM. The redrawing of supply lines results in a reduction in real household consumption in every Asia-Pacific subregion, implying that increasing prices are likely to affect the most vulnerable households and increase inequality. CBAM is expected to reduce investment in the region. A proactive approach is needed for countries to lower the carbon intensity of industries and prepare their economies for a changing market environment supported by regional and multilateral cooperation. Some tangible policies that countries may consider and could be promoted through regional cooperation are set out below.

- a** Adopt climate-smart non-tariff measures and encourage voluntary eco-labelling. Such measures could include requirements related to energy performance, emissions from cars, and certification of the legal and sustainable sourcing of timber. Additionally, governments may want to encourage the adoption of voluntary sustainability standards, such as eco-labelling of emission-intensive goods and food products.
- b** Encourage climate-smart investment and private sector initiatives. Governments can play an important catalyst role by directing the investment bodies under their control to reorient their funds towards investing in low-carbon businesses. They can encourage other investors as well as companies to increase their sustainability reporting, adopt internal carbon pricing and set emission reduction goals aligned with what is needed to limit global warming to 1.5°C.
- c** Accelerate digital trade facilitation. Streamlining trade procedures reduces trade costs, makes trade more inclusive and significantly lowers CO₂ emissions associated with a given trade transaction. Governments may accelerate their trade digitalization efforts, including by acceding to the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific.
- d** Incorporate climate considerations in RTAs. Governments in the region should explore how RTAs can be used to incorporate precise, replicable and enforceable environment and climate-related provisions that help mitigate the negative impacts of trade on climate change and boost positive impacts. These agreements could integrate provisions related to most of the recommendations mentioned above, including binding commitments on fossil fuel subsidies and trade facilitation measures for environmental goods.
- e** Unilateral or regional carbon pricing mechanisms can help economies in the region prepare for potential border carbon adjustment taxes. Carbon-pricing instruments can be a powerful component of post-COVID-19 recovery packages, which could simultaneously address greenhouse gas emissions and raise much needed revenue. The proceeds from carbon-pricing schemes should be channelled towards green growth and the circular economy as well as to help those most affected by the schemes.

ENDNOTES

- 1 *Asia-Pacific Trade and Investment Report 2021* (see chap. 4, figure 4.3).
- 2 Ibid.
- 3 Matteo Rocco and others, “Fighting carbon leakage through consumption-based carbon emissions policies: empirical analysis based on the World Trade Model with Bilateral Trades”, *Applied Energy*, vol. 274 (September 2020).
- 4 *Asia-Pacific Trade and Investment Report 2021* (see chap. 4, figure 4.3).
- 5 Ibid.
- 6 Yann Duval and Simon Hardy, “A primer on quantifying the environmental benefits of cross-border paperless trade facilitation”, ARTNeT Working Paper Series, No. 2016 (Bangkok, ESCAP, 2021).
- 7 Note this figure acknowledges that there will be a limited increase in emissions due to increased use of digital infrastructure.
- 8 While data servers do consume power and somewhat offset the emissions efficiency gains, they are dwarfed by inefficiencies of paper based transactions, which often require physical movement of people to obtain necessary clearances.
- 9 European Union, “Key elements of the EU-New Zealand Trade Agreement”, 30 June 2022. Available at https://policy.trade.ec.europa.eu/news/key-elements-eu-new-zealand-trade-agreement-2022-06-30_en.
- 10 ESCAP calculations based on fDi markets.
- 11 Including Decision -/CMA.4 Matters relating to the work programme for urgently scaling up mitigation ambition and implementation referred to in paragraph 27 of decision 1/CMA.3; Draft decision -/CMA.4 Matters relating to the Standing Committee on Finance; Decision -/CP.27 Long-term climate finance; Draft decision -/CP.27 Matters relating to the Standing Committee on Finance; and Decision -/CMA.4 New collective quantified goal on climate finance. For texts of these and other decisions from COP27 see <https://unfccc.int/cop27/auv> (accessed on 21 November 2022).
- 12 Draft decision -/CP.27 -/CMA.4 Funding arrangements for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage (2022). Available at <https://unfccc.int/cop27/auv> (accessed on 21 November 2022).
- 13 Science Based Targets, “330+ target-setting firms reduce emissions by a quarter in five years since Paris Agreement”, 26 January 2021. Available at <https://sciencebasedtargets.org/news/330-target-setting-firms-reduce-emissions-by-a-quarter-in-fiveyears-since-paris-agreement>.
- 14 Carbon Footprint, “Internal carbon pricing”. Available at https://carbonfootprint.com/internal_carbon_pricing.html.
- 15 Nicolette Bartlett, Tom Coleman and Stephan Schmidt, *Putting a Price on Carbon: The State of Internal Carbon Pricing by Corporates Globally* (London, CDP, 2021). Available at https://cdn.cdp.net/cdp-production/cms/reports/documents/000/005/651/original/CDP_Global_Carbon_Price_report_2021.pdf?1618938446.

PART III



FINANCING CLIMATE ACTION AND MEASURING PROGRESS

CHAPTER 5

FINANCING THE TRANSITION TO NET ZERO

Upscaling climate finance

Transitioning economies in Asia and the Pacific to resilient and low-carbon pathways requires a bold global financing programme. The starting point for this is challenging. At the global level, the COVID-19 pandemic has depleted fiscal space and increased public debt, while the crisis in Ukraine has pushed up global food and fuel prices, exacerbating inflation. In response, central banks are increasing interest rates, which has tightened financial and liquidity conditions and increased the cost of servicing public debts. Capital has flowed out of the region to safe haven markets and dollar-denominated assets, causing many regional currencies to depreciate against the United States dollar. The International Monetary Fund (IMF) projects that one third of the global economy will be in recession in 2023.¹ Increasing the flow of public and private finance to support climate action in this environment is challenging.

A bright spot amid these challenges is the continued strength of and demand for private finance in the region for new sustainable financial instruments, such as green, social, sustainability bonds and sustainability-linked bonds (SLBs), which are already channelling finance towards climate action. Corporate and sovereign issuers in developing countries in Asia and the Pacific have led these issuances, with corporate issuances dominating, however, both types of issuances are often oversubscribed. Although such issuances have mostly been in countries with relatively developed domestic capital markets and investment-grade sovereign credit ratings, there is considerable room for growth in such instruments in other economies. Bank lending, which constitutes most of the lending in Asia and the Pacific, is increasingly adopting green norms and standards, reflecting a strengthening climate-related financial regulation at the global level. This trend should contribute towards enhancing the impact of bank lending on climate action.

Against this backdrop, the objective of this chapter is to evaluate how countries in Asia and the Pacific, particularly developing countries, can scale up financing for climate action. It includes an evaluation of the current status of climate finance in the developing countries of Asia and the Pacific, a description of the challenges and opportunities, and recommendations in seven areas.

Financial commitments are falling short

Although the availability of finance is a critical constraint to enhance climate action, data on the amounts needed are scarce and incomplete. One data source is the latest submission of NDCs by Asia-Pacific Parties to UNFCCC. NDCs set out commitments for mitigation and adaptation actions over the following five years, but the actual implementation of these actions is conditional on the availability of finance. Unfortunately, reporting financial needs is not mandatory and most countries do not provide this information. Of the 51 Asia-Pacific countries that are Party to the UNFCCC, only 17 have reported their financial needs, of which 12 have provided a breakdown of financing needs for mitigation and adaptation. Table 5.1 shows that the total financial needs for this group of countries are \$1.31 trillion, of which 80 per cent are from a single country, India, and 71 per cent are for mitigation.

Table 5.1. Financial needs for nationally determined contributions

| Party to UNFCCC | Financial needs (billion United States dollars) | | | Year of last submission |
|---|--|---------------|-----------------|-------------------------|
| | Mitigation | Adaptation | Total | |
| <i>East and North-East Asia</i> | | | | |
| Mongolia | 0.00 | 3.40 | 3.40 | 2020 |
| <i>North and Central Asia</i> | | | | |
| Georgia | 0.00 | 2.00 | 2.00 | 2021 |
| Kyrgyzstan | | | 6.30 | 2021 |
| Turkmenistan | 0.00 | 10.50 | 10.50 | 2016 |
| <i>The Pacific</i> | | | | |
| Fiji | | | 2.97 | 2020 |
| Kiribati | | | 0.08 | 2016 |
| Niue | | | 0.01 | 2016 |
| Palau | 0.01 | 0.00 | 0.01 | 2016 |
| Solomon Islands | 0.13 | 0.13 | 0.25 | 2021 |
| Tuvalu | | | 0.36 | 2016 |
| Vanuatu | 0.31 | 0.72 | 1.03 | 2021 |
| <i>South-East Asia</i> | | | | |
| Cambodia | 5.80 | 2.00 | 7.80 | 2020 |
| Lao People's Democratic Republic | 4.70 | 0.00 | 4.70 | 2021 |
| <i>South and South-West Asia</i> | | | | |
| Afghanistan | 6.62 | 10.79 | 17.41 | 2016 |
| India | 834.00 | 206.00 | 1 040.00 | 2022 |
| Iran (Islamic Republic of) | 52.50 | 140.00 | 192.50 | 2015 |
| Nepal | 21.60 | 0.00 | 21.60 | 2020 |
| Total | 925.66 | 375.53 | 1 310.90 | |
| Count | 12 | 12 | 17 | |
| Shares of mitigation/adaptation | 71 | 29 | | |

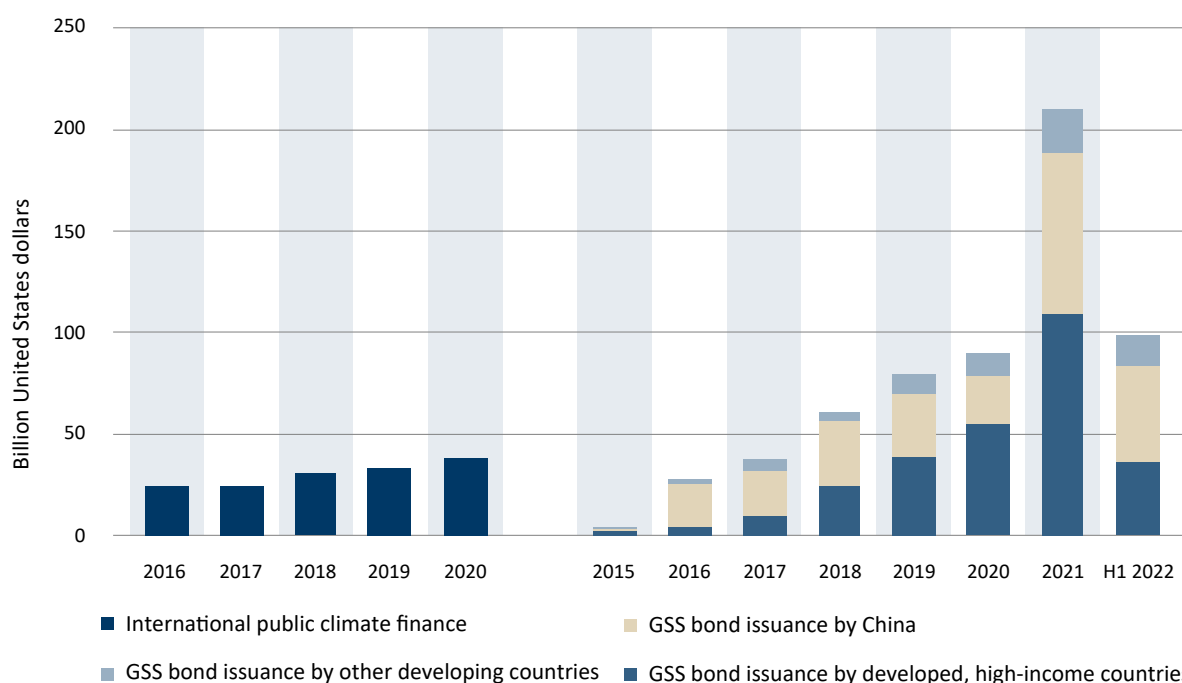
Source: ESCAP calculations based on data from Institute for Global Environmental Strategies, "IGES NDC Database". Available at <https://iges.or.jp/en/pub/iges-indc-ndc-database/en> (accessed on 21 October 2022).

Note: Only Parties to UNFCCC that report financing needs are included in the table.

Based on these figures, a rough estimate of the annual average financial needs to meet NDCs in selected developing countries in Asia and the Pacific is \$362 billion per year, of which \$258 billion is for mitigation and \$104 billion is for adaptation.²

Data on available financing are similarly uneven, except for international public finance and green, social and sustainability (GSS) bonds (figure 5.1). The former, which provides financing in the form of concessional loans and grants in addition to loans at commercial terms, is a major source of climate finance for most developing countries in the region. This financing comes from bilateral donors, multilateral development banks and other multilateral entities, such as climate funds. As shown in figure 5.1, financing to the region’s developing countries through international public sources increased from \$24 billion in 2016 to \$38 billion in 2020. This amount, however, is still substantially lower than the estimate of annual needs of \$362 billion based on NDCs.

Figure 5.1. Trend of climate finance to Asia and the Pacific



Source: ESCAP calculations based on data from the Organisation for Economic Co-operation and Development (OECD). “Climate change”, OECD DAC External Development Finance Statistics”. Available at <https://oecd.org/dac/financing-sustainable-development/development-finance-topics/climate-change.htm>; and Climate Bond Initiative, Interactive data platform. Available at www.climatebonds.net/market/data/ (accessed on 2 October 2022).

Note: H1 2022: first half of 2022.

As for GSS bonds, issuance in Asia and the Pacific reached \$210 billion in 2021 (figure 5.1), of which \$109 billion were issued by developed and high-income countries and \$80 billion by China.^{3,4} Of the remaining \$21 billion, \$19 billion were issued by a smaller number of other developing countries that have relatively advanced domestic capital markets and investment-grade sovereign credit ratings (India, Indonesia, Malaysia, the Philippines, Thailand and Türkiye) and only \$2 billion from other developing countries (Pakistan, Uzbekistan and Viet Nam). The proceeds of GSS bonds are not exclusively used for climate action; they are also used by social and are also used by social and environmental sectors. Nonetheless, there is substantial room for growth in the GSS bond market, as it has not been tapped by most developing countries in the region.

Information on other sources of finance, such as equity or bank loans, is even more incomplete. For equities, the total assets invested in sustainable funds in “Asia ex-Japan” (an aggregate that includes developing economies, such as China; Hong Kong, China; India; Indonesia; and Malaysia) reached close to \$70 billion in Q4 2021, but declined to less than \$50 billion in Q1 to Q3 2022.⁵ These data cover the total assets invested and not financial flows. The decline in this figure between Q4 2021 and Q1-Q3 2022 implies a negative investment flow of approximately \$20 billion. It is not clear, however, to what extent it represents to this change financing for climate action is represented. The data provider considers a fund to be sustainable on the basis of a claim in the fund prospectus or other regulatory filings that the companies included in the fund use environmental, social, or governance (ESG) factors as a central focus of their investment process.

The available data suggest that the available financing is clearly insufficient to meet the region’s requirements for investment in climate action or to contain global warming at 1.5°C. With only 7 years to 2030, it is imperative to scale up the available finance and increase climate action ambition.

Reducing bottlenecks to climate finance⁶

Developing a coherent policy environment

Scaling up climate finance involves transforming climate finance policies and other areas of business and investment policies, especially for businesses that are the underlying borrowers. Improving the bankability of their projects is key, including their compliance with climate and environmental standards and commitment. It is also necessary to ensure that risk and returns are in step with the relevant hurdle rates. To improve the bankability of projects and facilitate investment decisions, a coherent policy environment is of paramount importance, so it is necessary to end contradictions, such as ambitious emissions reduction targets being set while preferential treatment is extended to fossil fuels. In the absence of interim targets before 2050 and policies to incentivize the production and consumption of renewable energy, the cost of capital for investments in the energy transition will remain too high. The policy challenge is, therefore, not limited to mobilizing climate finance; it also involves balancing numerous competing policy choices and regulatory arrangements in many different sectors and levels of government.

Ensuring projects’ bankability

The paucity of bankable projects in national pipelines that can support climate action is a serious issue. Climate projects, particularly those involving adaptation or transition finance, are likely to require large upfront costs with returns over a longer term. Substantial risks may abound at the country level, sector level and the borrower and project developer level. Given the longer-term horizon, risks due to unanticipated external shocks must be considered. Untested regulatory environments and green business models entail risks to first mover investors. Accordingly, it is necessary to coordinate on standards, sectors and investor outreach. A whole-of-government effort is required for the development of nationally prioritized, pipelines of fit-for-purpose, bankable

climate projects. In many cases, significant support is also needed to build projects that are bankable through blended finance or other means.

Improving data, disclosure and reporting frameworks

Most reporting to regulators is rooted in prudential monitoring and focused on specific sectors, products or risk exposures. Consequently, there is a lack of clarity or transparency on the ultimate purposes of financing and how it relates to national climate goals embedded in NDCs. Many sustainability reporting frameworks and standards have been developed,⁷ but only a few regulators in the Asia-Pacific region have access to the data from financial institutions or government and supranational agencies required to assess climate risks and price. Nor do many have access to, or the expertise to use, the complex models required to measure and monitor climate risks.

The lack of access to relevant data by banks, borrowers and issuers precludes compliance with international capital regulations, including the European Union taxonomy for European investors. This further impedes access to climate finance. Capacity-building needs to be given to many developing countries in such areas as tailoring regulations to meet their contexts, developing common ground taxonomies, and third party verification of data and standards. Collecting and tracking such data are necessary to nudge the region's financial institutions and businesses towards transition planning and better ensuring the region will meet its NDC goals. Such requirements can be phased in and implemented proportionately to a bank or company's size and ability.

Reducing the cost of regulatory compliance

Collecting and collating data to comply with environmental and social risk management (ESRM) guidelines can be expensive, especially in cases in which substantial changes are required in the business and operating models of financial institutions. Support is required, but it is often unaffordable due to the large scale at which it is needed. Regulators are already highlighting pushback from financial institutions and their industry associations about the cost of implementing enhanced regulations to support sustainable finance. They argue that many of their customers are ill-placed to provide the required data and fear the additional compliance costs will result in reduced access to finance. A related issue is the need to establish a level playing field within a jurisdiction and regionally to avoid regulatory arbitrage. With emerging requirements on disclosure standards, these challenges will further increase. New technologies pertaining to data collection can bring down some of these costs. Regionally, the sharing of best practices by countries that are further ahead with regard to standards and compliance can facilitate the process for others.

Innovative financial instruments

Green and sustainability-linked bonds

The standards on external reviews and impact assessments for the issuance of green bonds is tighter for sovereign issuers than for corporate issuers. Evidence from advanced and emerging market countries suggests that the inaugural issuance of sovereign green bonds tends to tighten standards for overall green issuance, leading to an increase in the percentage of corporate issuances with second-party opinions. Countries that have not yet issued green or similar bonds, which are most developing countries in Asia and the Pacific, could, therefore, opt to set up the appropriate policy and legal frameworks and build capacities for a sovereign issuance of green bonds.

Sustainability-linked bonds are becoming more popular. These instruments specify pre-defined sustainability performance targets that the issuer commits to meet by a given date. If the targets are not met, the issuer is subject to a penalty, a mechanism that is absent in the case of conventional

green bonds. Given this feature, the issuer can link SLBs directly to reducing greenhouse gas emissions. Another advantage of SLBs is that they can be issued across a diverse range of sectors, as opposed to GSS bonds, which target specific uses of proceeds associated with a limited number of sectors.⁸ A similar product available to banking institutions and their borrowers is sustainability-linked loans.

Carbon-pricing policies to reduce emissions

Setting a carbon price can significantly change the behaviour of emitters. A tax on CO₂ emissions increases the cost of fossil fuels, disincentivizes their consumption and reduces the attractiveness of investing in their production. An emissions trading scheme (ETS) also increases the cost of fossil fuels for consumers by capping the total level of emissions and allowing entities with low emissions to sell their additional allowances to larger emitters. ETS belongs to the category of compliance carbon markets in which participation is required by law for certain organizations and sectors. There are also voluntary carbon markets which allow businesses to buy carbon credits or offsets as a means to move towards net-zero emissions.

The main objective of carbon pricing is to discourage carbon-emitting activities. Yet it also stimulates clean technology, market innovation and new, low-carbon drivers of economic growth. If the revenue raised from carbon taxes were collected effectively and channelled back into the economy to compensate low-income groups, this could reduce inequality, support progress towards emissions targets and reduce air pollution.⁹ ESCAP has estimated the benefit of phasing out fossil fuel subsidies and introducing carbon pricing to more than 2 per cent of GDP by 2030.¹⁰

To fulfil the potential of carbon-pricing policies, much work is required. Too few countries have a carbon tax or ETS. Those that exist are designed differently, resulting in substantial differences in the price of carbon.¹¹ Voluntary carbon markets are unregulated. They lack commonly agreed standards to verify that the carbon traded is prevented from being released into the atmosphere. There is, nonetheless, great potential to strengthen and move towards the harmonization of standards to improve the functioning of carbon markets. The interconnection of national carbon markets is being explored by some countries in the region as a promising way forward.¹² Regional cooperation can support developing countries in designing carbon-pricing policies and interconnect their national carbon markets.

Recommendations

Scaling up climate finance is a complex task. This section proposes recommendations in seven intertwined areas.

Ensuring the coherence of national policies and regulations to incentivize private and public climate finance

Scaling up climate finance involves improving climate finance policies. Yet it also requires aligning competing policy choices and regulatory arrangements in many sectors and levels of government to ensure that businesses and investors are incentivized to invest in climate action. Because all investment decisions are based on risk and returns, which depend fundamentally on the policy and regulatory environment of a country, it is critical that policies and regulations are coherent. This is often not the case.

For instance, establishing an ambitious net-zero greenhouse gas emissions target for 2050 will not single handedly stimulate the flow of finance towards climate action if the consumption of fossil fuels continues to be subsidized. If supporting the energy transition and the adoption of new green technologies for a low-carbon transition are important policy goals, the country's regulations need

to ensure green investments are clearly and efficiently regulated, with low transaction costs related to approvals, permits and compliance. Ensuring policy and regulatory coherence would result in less expensive and more abundant financing of investments for climate action. In this regard, carbon-pricing policies can provide a clear signal on the cost of carbon emissions in the economy, guiding the decisions of issuers, borrowers and investors.

Improving the clarity and consistency of domestic financial regulations and their convergence with international sustainable finance standards

Every country has multiple regulators that cover the area of climate finance, including central banks, capital markets regulators, departments of industry, environmental protection agencies and energy regulators. Many have limited experience in integrating emerging climate standards and ESG standards into lending, investment or electricity regulations. This challenge is compounded by financial regulators being tasked with aligning their jurisdiction with that of other regulatory authorities, such as environmental protection agencies. These agencies issue environmental permits for new investment projects and also develop new climate standards. This presents unparalleled challenges for regulatory coordination and coherence with unfortunate implications for the prospects of private finance. Regulatory uncertainty and lack of coordination is a key pricing risk.

For financial regulators, the interconnected nature of global capital flows means that convergence with international sustainable finance standards is increasingly a key feature of international financial competitiveness. Although international sustainable finance standards are not always immediately appropriate for less advanced economies, signaling regulatory intentions to eventually converge with international financial standards would encourage investor confidence in these markets. All markets recognize that financial regulations globally are going through a watershed moment, and that regulations will continue to change for some time to come as standards and disclosure requirements evolve.

While it is challenging to conform to multiple or changing regulatory norms, regulatory clarity and consistency pertaining to the regulatory journey is essential. This clarity and consistency will do much to strengthen both domestic and international investor confidence and subsequent investments. A key requirement is, therefore, to ensure domestic financial institutions and businesses start planning for the transition early, with interim targets before 2050 or 2060, and that they disclose their transition planning strategies. This can be progressively imposed depending on institutions' size and capabilities, as is being done elsewhere in the world.

The increasing adoption of sustainable finance road maps by regulators that cover climate finance provides a clear signal that regulators are committed to climate action. The purpose of such road maps is for private and public sector actors to coalesce around a sequenced action plan that would gradually align a country with sustainable finance regulation international best practices. An important component in their development is the adoption of an effective taxonomy. A green taxonomy is a framework for defining what can be called environmentally sustainable investments, usually covering multiple sectors, and setting forward requirements and recommending alignment with existing standards. It allows businesses and investors to more clearly direct investment and project development choices. Developing a sustainable finance road map or a taxonomy before completion institutions require effective coordination among regulators and robust consultation with the private sector and institutions.

Preparing effective financing strategies for nationally determined contributions and national adaptation plan processes

A growing number of developing countries are preparing financing strategies in line with their NDCs that set out a prioritized list of adaptation actions in line with their NAPs. Others are setting broader climate change financing strategies. As 2030 approaches, governments are focused on the task of finding the necessary finance for the promised transformation. Such financing strategies should be focused, have political and private sector buy-in and be progressively sequenced. Decisions are needed on which areas to start with first and how to do so. Existing evidence suggests strategies should focus on needed improvements in the enabling environment to encourage increased private-sector investment. A financing strategy must be broader than seeking resources from developed countries. It should include changes to the policy and regulatory environment related to finance and must consider the political economy of such financing within the country, especially with domestic investors and businesses.

The preparation of such financing strategies must involve private finance from the outset, although this presents multi-stakeholder coordination challenges. Without the effective inclusion of private finance, it is not possible for the ministry in charge of NDC planning to translate a country's needs and opportunities into a national list of feasible priority investments. This process should include an assessment of regulatory and policy gaps, which need to be filled to support private sector financing of adaptation, transition and mitigation.

A complementary task to strengthening financing strategies in support of NDCs is to build capacities on the connection between climate and financial issues among policymakers in the related ministries, not only the NDC lead ministry. As these ministries coordinate the preparation of financing strategies with the private sector and financial institutions, it is necessary to build awareness and the relevant skills among the latter actors, together with regulatory participation.

Engaging private finance and project developers in the pre-investment phase of project development

Countries' financing strategies should first focus on the energy transition, including financing the managed phase out of coal. Considering this objective, WMO is clear the supply of electricity from clean energy sources must double within the next eight years before 2030 to limit the global temperature increase.¹³ The Secretary-General's Five Point Energy Plan further calls for private and joint private and public investments in renewable energy to triple to at least \$4 trillion dollars a year.

According to IEA, energy investments in emerging and developing economies rely heavily on public sources of finance. Yet in its climate-driven scenarios, more than 70 per cent of clean energy investments are privately financed, especially in renewable power and energy efficiency.¹⁴ Accordingly, the question of crowding private finance into national efforts to reduce emissions is the main challenge at a time of fiscal constraints. In the Asia-Pacific region, the recently announced¹⁵ Indonesia Just Energy Transition Partnership (JETP) seeks to meet these challenges by creating a country platform of coordinated policies and bankable energy projects. Together, these aim to mobilize \$20 billion over the period 2023-2028 to accelerate a just energy transition. Ten billion dollars of public money will be mobilized by the International Partners Group members (France, Germany, the United Kingdom, the United States and the European Union), and at least \$10 billion of private finance will be mobilized and facilitated by the Glasgow Financial Alliance for Net Zero (GFANZ) Working Group.

In December 2022,¹⁶ another JETP was announced in Viet Nam, which plans to mobilize an initial \$15.5 billion of public and private finance over the next 3 to 5 years to support the country's green

transition. Initial contributions to this JETP include \$7.75 billion in pledges from the International Partners Group (IPG) together with ADB and the International Finance Corporation (IFC). This is supported by a commitment to work to mobilize and facilitate a matching \$7.75 billion in private investment from an initial set of private financial institutions coordinated by GFANZ, including Bank of America, Citibank, Deutsche Bank, HSBC, Macquarie Group, Mizuho Financial Group, MUFG, Prudential PLC, Shinhan Financial Group, SMBC Group and Standard Chartered.

The JETPs of Indonesia and Viet Nam provide a model to the rest of the region to focus their financing strategies. The JETPs coordinate national commitments to peaking emissions, phasing out coal, improving regulations and ensuring bankable projects for private and public finance. This national approach has mobilized private finance commitments in addition to donor finance. For the rest of the region's developing countries, the model demonstrates that pragmatically focusing on coherent change within a specific sector, instead of an overwhelming overhaul of every sector and industry in line with NDCs, yields the best results.

Strong policy and regulatory commitment in a specific sector signal to investors that pricing risks around regulatory and policy uncertainty are likely to subside, reducing the cost of financing. A combination of policy and regulatory improvement with investor participation from the inception of projects is needed to overcome the current mismatch between the demand and supply of private finance for the energy transition. Many private investors in energy transition projects worldwide find they are involved too late and are expected to co-finance projects that have been pre-designed in too restrictive a fashion. In some cases, the best returns within a project are already dedicated to one investor (often a multilateral development bank if a least developed country is involved), leaving other private investors with less attractive returns within their share of the project and reducing the volume of financing available.

Engaging private finance and project developers, especially domestic financial institutions, in the pre-investment phase of project pipelines is, therefore, critical. Energy or low-carbon transition project pipelines should not only be restricted to renewable energy pipelines, but they need to include construction, chemicals, heavy trucking and shipping. These sectors all use fuel-intensive energy and need to switch to other sources of energy to achieve deep emissions reductions. This also includes projects to enhance the efficiency of industrial equipment and heavy transport, as well as investments in the research and development or piloting of new low-carbon technologies, such as green hydrogen, and in carbon capture technologies.

Strengthening the capacities of banking and capital markets regulators

There is much discussion at the global level on how financial regulators should incorporate climate-related financial risks in their supervisory activities. Standard-setting bodies, such as the Basel Committee on Banking Supervision (BCBS), the Task Force on Climate-related Financial Disclosures (TCFD), the upcoming International Sustainability Standards Boards or the International Organization of Securities Commissions provide regular recommendations, particularly for large or listed financial institutions. It is important that financial institutions and regulators in Asia and the Pacific to remain abreast of these developments. They should consider adopting these recommendations, with suitable adjustments made according to the size of financial institutions and corporates regulated, given the cost of compliance.

The Basel Committee on Bank Supervision has recently issued general regulatory guidelines on climate-related financial risks for the banking sector based on 18 high-level principles, 12 of which apply to banks and 6 to bank supervisors.¹⁷ While the principles are to be applied on a proportionate

basis depending on the size, complexity and risk profile of the bank or banking sector, in the guideline, it is emphasized that “smaller banks and authorities in all jurisdictions can benefit from a structured consideration of the potential impact of climate-related financial risks.”¹⁸ The principles stipulate that banks should have the capacities to understand and assess the potential impacts of climate-related risks on their businesses and on the environments in which they operate, and to incorporate climate-related financial risks into their overall business strategies and risk management frameworks.

Banks should, therefore, set up appropriate governance structures, policies and procedures. They should be able to incorporate climate-related risks into their internal assessments of capital and liquidity adequacy and into their risk management frameworks. Banks are expected to be able to monitor such risks and produce timely reports to ensure effective decision-making. In their internal assessments, banks should be able to consider climate-related credit, market, liquidity, operational and other risks. The principles for supervisors aim to ensure they have the capacities to monitor banks’ ability to manage climate-related financial risks.

These requirements come in addition to the ESG risk management approaches already adopted to varying degrees by central banks and financial institutions in the region. In parallel, ESG risk management norms and practices are also increasing in stringency and complexity following debates over greenwashing, and after the European Union Sustainable Finance Disclosure Regulation, which is relevant to any European investor investing in Asia and the Pacific.

The development of supervisory and regulatory approaches to climate-related financial risks are at an early stage in most jurisdictions, including developed countries. The lack of sufficiently consistent, comparable, granular and reliable climate data reported by financial institutions is a major challenge. Nonetheless, it is important for financial regulators across Asia and the Pacific to continue to strengthen their ESG practices and to gradually incorporate climate-related financial risks into their practices. Both require substantial technical capacity. Dedicating attention and resources to such capacity-building is critical.

Promoting regional cooperation to scale-up climate finance

The regulatory and policy enabling environment surrounding climate finance is changing rapidly in developed countries and will eventually affect less developed countries. These countries have the opportunity to leapfrog the learning journey and take advantage of existing training, new regulatory technology and political economy lessons learned.

Targeting and coordinating technical capacity-building efforts in the region requires cooperation among various development partners, including multilateral development banks, bilateral donors and United Nations agencies. ESCAP, as the most comprehensive regional cooperation platform for member States in Asia and the Pacific, has an important role to play given that NDC financing strategies are led by member State governments.

Cooperation around lessons learned is essential to build coherent policies and efficient coordination in-country, co-create bankable projects with the private sector and financial sector, and strengthen regulatory frameworks to stringently manage ESG. Such cooperation does not need to be formalized and can be part of an existing programme of regional meetings. Progressive and iterative cooperation can be aided by producing strong technical agendas, connecting experts and promoting South-South learning and cooperation.

Create an investor-advised regional small-ticket project preparation fund to defray the costs of preparing energy transition or low-carbon-transition projects for private financing

While regional cooperation on climate finance can be intelligently integrated within existing regional platforms, what is missing, according to investors and project developers, are resources and support for small-ticket investment pipeline preparation.

For a full pipeline of energy transition projects to materialize at a large scale and a rapid pace, underlying pipelines of smaller energy transition projects of smaller-ticket sizes are required. This is typical for investments in general. Angel investment provides a proving ground for companies with strong ideas or concepts. As their concepts reach the early stages of becoming proven, these companies are able to raise larger-ticket Series A and B venture capital. Upon proving themselves more and growing even further, larger-ticket private equity funds invest in these companies believing they can grow these companies all the way to an initial public offering (IPO) and listing on a stock exchange where retail investors can buy shares. The same principles apply, especially in new green technology companies, or in renewable energy in countries where there is not yet vibrant solar, wind or hydro sectors. Early support allows for companies to reach later stages of size and growth.

In the region, small ticket-size energy transition or low-carbon transition projects by businesses face high transaction costs to get off the ground. In some cases they are simply not eligible for large grant facilities, such as the Green Climate Fund or the Global Environment Facility. Neither are they eligible for the technical assistance grants delivered by multilateral development banks, which are mostly in coordination with a specific prospective investment by the multilateral development bank. When they are eligible, applications require significant skills which they lack.

Working with member States on the development of small-ticket pipelines by providing grants that cover these project preparation costs would enable the development of deeper pipelines and eventually accelerate the scale and pace of large-ticket pipelines. Grant financing is justified to defray the cost of preparing investment-ready projects in the energy transition to a low-carbon future because such costs are substantial and rarely fully recovered.

For project preparation funds to be used in an optimal manner and support the creation of genuinely investment-ready projects, the grant fund should be advised by a group of regional investors, including the financial institutions of Asia and the Pacific. This minimizes the risk of project pipelines for investment being created, but not receiving sufficient financing. By setting up a mechanism that enables project developers and financial institutions to meet regularly and co-create investment projects in a progressive and iterative manner, supported by grant funds that defray high risks surrounding the project preparation, the energy transition in Asia and the Pacific can be accelerated.

ENDNOTES

- 1 International Monetary Fund, *World Economic Outlook: Countering the Cost-of-Living Crisis* (Washington, D.C., 2022).
- 2 This figure is obtained as the annual average of the five-year financial needs of the 17 reporting countries extrapolated to the rest of the region. The extrapolation is based on population, assuming identical per capita needs across countries. While this is a rough estimate, it does not defer much from a more detailed estimation by ESCAP in 2019, which came out with an annual figure of \$454 billion. The estimate of \$362 billion per year, while substantive, is likely to be an underestimate given the insufficient ambition of the region's NDCs, as noted in chapter 1.
- 3 The developed and high-income economies are Australia; Japan; New Zealand; the Republic of Korea, Singapore; Hong Kong, China; and Macao, China.
- 4 World Bank, "GDP per capita", World Bank National Accounts Data. Available at https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=HK&most_recent_value_desc=false.
- 5 Morningstar, "Global sustainable fund flows: Q3 2022 in review", Morning Manager Research, 27 October 2022. Available at www.morningstar.com/lp/global-esg-flows. Morningstar considers funds as being sustainable on the basis of a claim in the fund prospectus or other regulatory filings that the companies have included in the fund use ESG factors as a central focus of their investment process.
- 6 This and the following subsection are based on *Sustainable Finance – Bridging the Gap in Asia and the Pacific* (forthcoming).
- 7 *Financing the SDGs to Build Back Better from the Covid-19 Pandemic in Asia and the Pacific*, ESCAP Financing for Development Series (United Nations publication, 2021).
- 8 Linklaters, "Global sustainable bond market raises \$442 billion in the first six months of this year with sustainability-linked bonds seeing sharpest growth", 25 July 2022. Available at www.linklaters.com/en/about-us/news-and-deals/news/2022/july/global-sustainable-bond-market-raises-442-billion.
- 9 In the ESCAP publication, *Economic and Social Survey of Asia and the Pacific 2020* highlights that phasing out fossil fuels and introducing carbon pricing could open up significant fiscal space as well as address air pollution and climate change.
- 10 *Economic and Social Survey of Asia and the Pacific 2020* (United Nations publication, 2020).
- 11 Environmental Finance, *Special Report: Asia-Pacific Carbon Markets* (London, 2022).
- 12 Asia-Pacific Economic Cooperation, *APEC Stocktake of Carbon Pricing Initiatives* (Singapore, APEC secretariat, 2022).
- 13 WMO, *2022 State of Climate Services: Energy* (Geneva, 2022).
- 14 IEA, *Financing Clean Energy Transitions in Emerging and Developing Economies* (Paris, 2021).
- 15 The White House, "Indonesia and international partners secure groundbreaking climate targets and associated financing", 15 November 2022.
- 16 European Commission, "Political Declaration on Establishing the Just Energy Transition Partnership with Viet Nam", 14 December 2022.
- 17 Basel Committee on Banking Supervision, *Principles for the Effective Management and Supervision of Climate-related Financial Risks* (Basel, Switzerland, Bank of International Settlements, 2022).
- 18 *Ibid.*, p. 2.

CHAPTER 6

MEASURING CHALLENGES AND PROGRESS

Climate action informed by data

To be effective, climate action by national, regional and global stakeholders must be underpinned by internationally comparable climate-related data. This includes data, statistics and indicators on the drivers of climate change, its impacts and the vulnerabilities it creates, as well as on mitigation and adaptation efforts.¹ Quality data are needed to set informed climate priorities and action to support resource and investment mobilization aimed at reversing the climate crisis, and to track progress. Effective multilateral climate action requires climate evidence that is internationally consistent and comparable to support informed negotiations, investments and interventions at all levels.

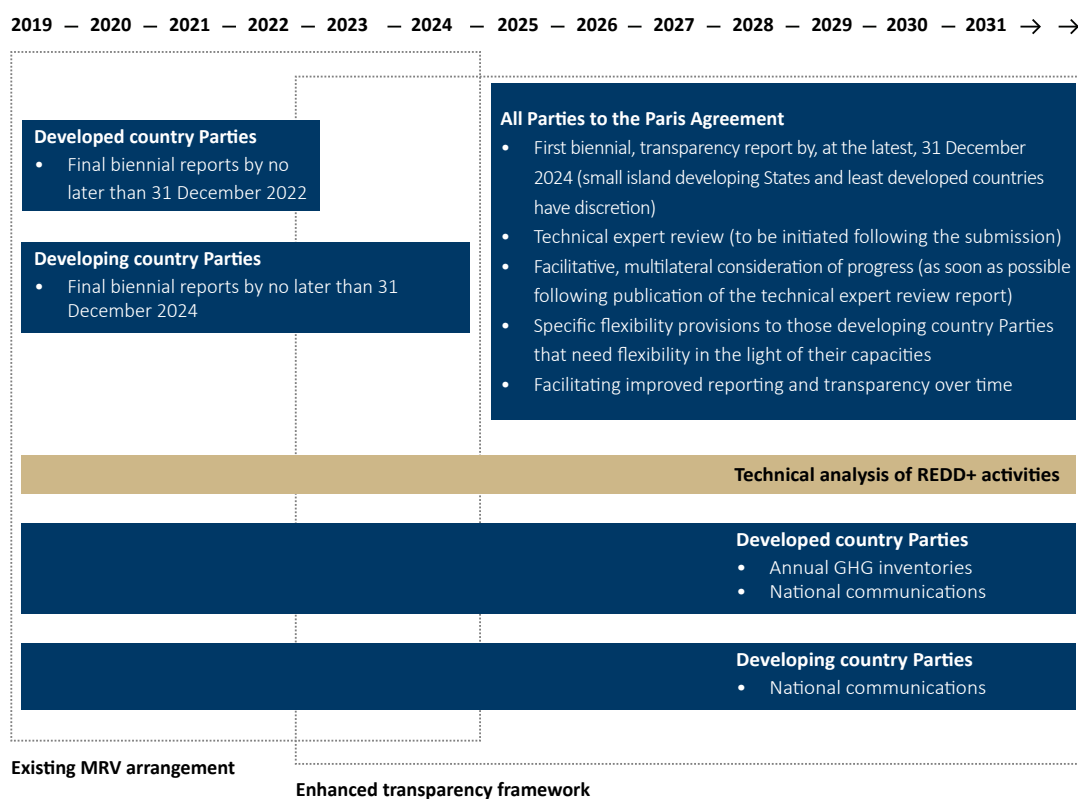
In the national context, much of the relevant information is collected and held by government agencies, and scientific and research institutions. Different concepts, methods, terminologies and definitions in data production are frequently used by each institution, which makes it challenging to provide coherent evidence for use in national climate decisions, let alone internationally comparable information to inform multilateral climate negotiations and action. The challenge is compounded by issues surrounding data coordination and data governance. The production and policy use of climate change-related information will benefit immensely from internationally agreed concepts and frameworks.

Changes to measuring progress

The United Nations Framework Convention on Climate Change considers “common but differentiated responsibilities and respective capabilities” in country commitments, recognizing Parties’ different duties and abilities to address the negative impacts from climate change. This principle is reflected in the accompanying reporting obligations. The flexibility and difference in reporting details have posed a challenge to global data comparability and aggregation to track progress in climate action. Under the Paris Agreement, the implementation of national climate commitments - reflected in NDCs - will be reported periodically and voluntarily in several reporting arrangements.

A unified system for reporting for developed and developing countries will be put in place in 2024. Biennial reports and update reports will be replaced by the new biennial transparency reports in December 2024 under the Enhanced Transparency Framework. This Framework was established for reporting and reviews under the Paris Agreement to ensure the transparency of mitigation and adaptation actions and support. As with all reporting arrangements, guidelines and reporting templates² are available to assist countries in their communication preparations. This includes information relevant to the reporting of greenhouse gas inventories, mitigation and adaptation actions, international support needed and received, and specific areas for improvement.

Figure 6.1. Moving towards the Enhanced Transparency Framework



Source: United Nations Framework Convention on Climate Change (UNFCCC), *Reference Manual for the Enhanced Transparency Framework under the Paris Agreement* (Paris, 2022), p. 77.

Furthermore, the Global Set of Climate Change Statistics and Indicators, which was adopted by the United Nations Statistical Commission in March 2022, provides countries with a common guideline and methodology for preparing national sets of climate change statistics and indicators according to their individual concerns, priorities and resources. The Global Set covers 158 indicators in five policy areas, drivers, impacts, vulnerability, mitigation and adaptation. It will also offer implementation guidelines, which will be supported by the Climate Change Statistics and Indicators Self-Assessment Tool (CISAT).

The Sendai Framework monitoring helps countries gain a better and more coherent understanding of risks and impacts from climate change. It includes targets to reduce disaster impacts and increase coverage of disaster risk reduction strategies, early warning systems and international collaboration and support to developing countries. Country reporting under the Framework covers a variety of disaster types, including, among them, sudden-onset disasters, such as flash floods and landslides, and slow-onset disasters, such as drought and sea-level rise, which can be attributed to human-induced climate change. The Framework, therefore, supports the collection, analysis and use of data to better understand disaster risks and strengthen actions to increase climate resilience in the region.

Wide gaps in measuring progress

Combating climate change and the required data to do so feature prominently in the Sustainable Development Goals. Goal 13 focuses on climate change while climate change is also reflected in several other Goals (see table 6.1). According to the Global Set,³ climate change-related Sustainable

Development Goal indicators are relevant to Goal 13 on climate action (5 indicators), Goal 1 on no poverty (2 indicators), Goal 2 on zero hunger (3 indicators), Goal 3 on good health and well-being (1 indicator), Goal 5 on gender equality (1 indicator), Goal 6 on clean water and sanitation (6 indicators), Goal 7 on affordable and clean energy (5 indicators),⁴ Goal 9 on industrial innovation and infrastructure (1 indicator), Goal 11 on sustainable cities and communities (6 indicators), Goal 12 on responsible consumption and production (3 indicators), Goal 14 on life below water (3 indicators), and Goal 15 on life on land (6 indicators).

Table 6.1. Climate change-related Sustainable Development Goal indicators

| Climate change dimension | Sustainable Development Goal indicator |
|----------------------------------|---|
| Drivers (4 indicators) | (7.3.1) Energy intensity, (9.1.2) Passenger and freight volume, (12.c.1) Fossil-fuel subsidies, (13.2.2) Greenhouse gas emissions |
| Impacts (11 indicators) | (6.3.2) Water quality, (6.4.2) Water stress, (11.5.1) Deaths/missing/affected from disasters, (11.5.2) Economic loss and affected infrastructure & services from disasters, (11.6.2) Urban particulate matter, (14.3.1) Average marine acidity, (14.4.1) Fish stocks within biologically sustainable levels, (15.1.1) Forest area rate, (15.3.1) Proportion of land that is degraded, (15.5.1) Red List Index, (15.8.1) Prevention or control of invasive alien species |
| Vulnerability (11 indicators) | (1.1.1) International poverty, (1.3.1) Social protection, (2.1.1) Prevalence of undernourishment, (2.1.2) Moderate or severe food insecurity in the population, (3.8.1) Essential health services coverage, (6.1.1) Safely managed drinking water services, (6.2.1) Open defecation and handwashing, (7.1.1) Access to electricity (7.1.2) Reliance on clean energy, (11.1.1) Urban slum population, (11.6.1) Urban solid waste collected |
| Mitigation (4 indicators) | (7.1.2) Reliance on clean energy, (7.2.1) Renewable energy share, (7.a.1) International support for clean and renewable energy (least developed countries), (13.a.1) Developed countries commitment of \$100 billion |
| Adaptation (13 indicators) | (2.4.1) Area under productive and sustainable agriculture, (5.5.2) Proportion of women in managerial positions, (6.3.1) Wastewater safely treated, (6.4.1) Water use efficiency, (11.7.1) Urban open space for public use, (12.5.1) Recycling rate, (12.6.1) Companies publishing sustainability reports, (13.1.2) Score of adoption and implementation of national DRR strategies, (13.1.3) Proportion of local governments that adopt and implement local disaster risk reduction strategies, (13.3.1) Integration of climate change in education, (14.2.1) National exclusive economic zones managed using ecosystem-based approaches (15.1.2) Sites for terrestrial and freshwater biodiversity, (15.2.1) Sustainable forest management |

Source: United Nations Statistics Division, Global Set of Climate Change Statistics and Indicators. Available at <https://unstats.un.org/unsd/envstats/Climate%20Change/Global%20Set.xlsx>.

Most climate change-related Sustainable Development Goal indicators are relevant to adaptation, vulnerability, or to the impacts, and cover a broad spectrum of Sustainable Development Goals and Sustainable Development Goal targets. Sustainable Development Goal indicators on drivers of climate change and its mitigation (4 indicators each), on the other hand, predominantly are focused on information related to energy use and greenhouse gas emissions.

Climate change-related data are needed for planning, implementing and monitoring progress towards meeting global and national climate commitments, as well as for other development agendas. Data investment decisions should, therefore, take into account the cross-cutting and interlinked nature of climate change-related data within the entire national data ecosystems. A system-wide approach to capacitating national statistical systems should be considered to increase countries' readiness in response to the ever-growing data demands. This is critical as countries continue to strengthen their efforts to implement the 2030 Agenda for Sustainable Development in the context of the 2023 mid-term review of progress towards realizing the Sustainable Development Goals.

In Asia and the Pacific, for one fourth of the climate change-related Sustainable Development Goal indicators (as defined by the list in table 6.1), the data are insufficient effectively monitor progress towards achieving the climate change-related targets and goals of the 2030 Agenda.⁵ Data gaps are particularly concerning in the areas of climate change impacts and adaptation in which for approximately 40 per cent of the indicators, there are insufficient data to guide collective action in the region. Tracking progress of these indicators enables planners to identify critical priority areas and support the design and implementation of national and multilateral climate strategies and actions. The data gaps in the region prevent proper planning and interventions in the areas informed by at least one fourth of the indicators. Furthermore, in 2023, most of the available data are lagging by a few years. The data available date back to 2019 or 2020, which are the normal reporting timeline.

The dire data situation speaks to the urgent need to strengthen and invest in statistical capacities. National statistical systems and policy communities must come together to set data priorities and implementation plans informed by climate-related development commitments and aspirations.⁶ By acting together, a course can be set to improve climate change data ecosystems, multi-stakeholder engagement and climate data governance. The often-underused existing data and knowledge should be maximized to inform climate action in line with internationally recognized statistical frameworks and guidelines. The wealth of untapped data from alternative and innovative sources should be used to supplement the evidence base for timely climate decisions. Catalytic support provided through regional collaboration could help enhance standardization efforts, alongside South-South and triangular cooperation in regional climate data action.

Improving official climate change statistics

All countries have some data and statistics related to climate change and all countries have data gaps. Many of them have initiated plans and processes to navigate the multi-faceted challenges of climate change-related statistics to close their data gaps. To succeed, it is important to consider the characteristics of existing national data ecosystems and the institutions operating in the ecosystem, as well as any technical and financial gaps or opportunities. Some ongoing efforts are presented below:⁷

- In Kazakhstan, the road map for the implementation of the updated NDCs provides a policy and statistical basis for the production and use of climate change-related statistics and is coordinated by the Ministry of Ecology, Geology and Natural Resources. The national statistical office (NSO) is involved in data provision to support national reporting obligations as well as through an interinstitutional environment statistics committee that strengthens multi-domain statistics, including those relevant to climate change.

- In Mongolia, the Ministry of Environment and Tourism oversees the implementation of the national action programme on climate change. As part of its implementation, NSO plays a data support role including statistics relevant to the country's commitments and reporting to UNFCCC.
- In Thailand, work to advance climate change-related statistics is under the purview of the Natural Resources and Environment Statistics Subcommittee, represented by all national agencies with legal and technical mandates related to natural resources and the environment. This multi-stakeholder subcommittee sets the strategic direction and coordinates the production of environment statistics within the entire national statistical system to provide evidence and support the implementation and monitoring of national policy objectives set out in the national economic and social development plan and in the climate change master plan.
- In Türkiye, the Turkish Statistical Institute plays a key role and is a national inventory focal point to UNFCCC for climate change-related statistics. The preparation of the 2022–2026 official statistics programme included the role of the Institute as a national coordinator of climate change-related statistics that are currently being produced by different agencies and institutions in Türkiye.

Good practices of global relevance to advance evidence for climate action can be drawn from the above country-driven initiatives in the Asia-Pacific region:

- International and, equally importantly, country-owned climate commitments provide a strong basis for action to improve climate change-related information. National and multilateral visions to combat climate change create an enabling environment and generate policy demand for more and better climate data.
- The multidisciplinary nature of climate change requires a multi-departmental approach to collecting data and statistics. Multi-stakeholder committees enable the integration and synergies of knowledge and expertise among sector agencies and institutions towards attaining a coherent set of information in support of climate action.
- The roles and responsibilities of NSOs contribute towards strengthening climate data ecosystems. Engagement of NSOs, from data provision to leading climate data production and coordination, ensure alignment with relevant national statistics and internationally recognized statistical standards, frameworks and guidelines.

To institutionalize climate change statistics at the national level and improve climate reporting, conducting an assessment of climate change statistics using the Global Set and its supporting tool, CISAT, is advisable. Some necessary measures to achieve this are strengthening collaboration between NSOs and focal points to UNFCCC, increasing the involvement of NSOs in data submissions to UNFCCC for supporting the implementation of the Paris Agreement, and developing national climate change statistics programmes and action plans. Specialized surveys on climate change statistics or including related questions in existing surveys and censuses can also make a positive contribution, as can producing and disseminating climate change statistics through dedicated reports and websites.

Strengthening regional cooperation

Countries have committed to act on climate change, nationally and through global agreements. However, producing the evidence to measure progress and inform climate action is a challenge for countries in the Asia-Pacific region. It is important to direct priorities towards data and statistics to inform strategies to mitigate and adapt to reduce climate change impacts in the short and long term. The dire data situation requires joint efforts to support national statistical systems to regularly produce data and information required to report progress and enable climate change data ecosystem stakeholders to act. Accordingly, the ESCAP Committee on Statistics, held in Bangkok from 23 to 25 August 2022, decided to advance broader measures of progress on climate change-related statistics and to navigate complex data governance choices.

An inter-institutional approach to climate change data with the involvement of NSOs has proven effective in improving and coordinating national climate change data ecosystems guided by national and international climate commitments and relevant international statistical frameworks. Governments with greater capacity should consider increasing their assistance in this area to those in greater need. There is also a need for closer and stronger regional collaboration to provide such support and to advance standardization efforts.

Following the operationalization of ETS under the Paris Agreement and the adoption of the Global Set, regional collaboration on knowledge-sharing and capacity-building could also support efforts to meet the requirement of the biennial transparency report submission and to develop national sets of climate change statistics and indicators. This will assist NSOs of member States in their efforts to collaborate with national climate policy authorities to achieve the following:

- Develop national climate change statistical programmes;
- Strengthen the capacity to monitor climate change impacts, adaptation and mitigation actions;
- Increase involvement in climate change-related, data collection and submission of indicators to UNFCCC for supporting the implementation of the Paris Agreement;
- Produce and disseminate climate change statistics to wider national policymakers and stakeholders.

ENDNOTES

- 1 United Nations Statistics Division, “The Global Set of Climate Change Statistics and Indicators” (New York, 2022). Available at <https://unstats.un.org/unsd/envstats/climatechange.cshtml>.
- 2 For further information on reporting templates and outlines, please visit for common reporting tables, <https://unfccc.int/sites/default/files/resource/Transparency%20CRT.pdf>; and for outlines of biennial transparency report, national inventory document and technical expert review report, <https://unfccc.int/sites/default/files/resource/DT.SBSTA52-55.i14d.pdf>.
- 3 United Nations Statistics Division, “The correspondence between the Global Set of Climate Change Statistics and Indicators and the SDGs”. Available at <https://unstats.un.org/unsd/envstats/Climate%20Change/Global%20Set.xlsx> (accessed on 7 November 2022).
- 4 Sustainable Development Goal indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology appears twice as it is relevant to both climate change vulnerability and mitigation. The actual number of climate change-related Sustainable Development Goal indicators under Goal 7 is five. Accordingly, the total number of climate change-related Sustainable Development Goal indicators is 42.
- 5 The overall Sustainable Development Goal data gaps are 103 of 231 indicators. It means that data availability for climate change-related Sustainable Development Goal indicators is better than average. This may be attributed to the many years of national climate change inventory reporting, but could also reflect the indicator formulation and selection where data availability may have been a criterion.
- 6 Available tools to assist with this process are the EPIC Tool. Available at www.unescap.org/our-work/statistics/EPIC; and Resource Platform on Environment Statistics. Available at <https://stat-confluence.escap.un.org/display/RPOES>.
- 7 United Nations Statistics Division, Global Consultation on Climate Change Statistics and Indicators.

PART IV

**MORE RAPID
AND EFFECTIVE
CLIMATE ACTION**



CHAPTER 7

ENHANCING REGIONAL COOPERATION

Accelerating low-carbon transition in key sectors

Accelerating the energy transition

To scale up the use of renewables and accelerate the energy transition, the region needs to strengthen multilateral, subregional and regional power connectivity by developing enabling frameworks, such as intergovernmental agreements on energy cooperation and interconnection. The harmonization of institutional policies and regulatory regimes is needed to underpin multilateral trade and competitive markets for cross-border electricity. It would, therefore, be beneficial to **develop a regional green power corridor framework that would presents scenarios for the increased deployment of renewable energy** through a cross-border power system and includes principles for aligning power system connectivity with national sustainable development agendas.

The region needs to quickly improve energy and carbon intensity. Technical cooperation is required to **develop and promote regional fuel efficiency and minimum energy performance standards** to boost energy efficiency, reduce manufacturing costs and support the development of regional markets and economies of scale. Furthermore, as Asia and the Pacific is the fastest-expanding region in terms of energy demand and the growth of renewable energy over the coming decades, it could benefit from **a joint assessment, coordination and diffusion of emerging technologies and the regional value chain for alternative fuels**, including green hydrogen. Developing this renewable resource at scale and enabling market trade require coordination at the regional level, common standards and frameworks that consider the whole value chain and generate demand.

Achieving low-carbon mobility and logistics

The decarbonization and transformation of the transport sector is critical to be able to reduce CO₂ emissions rapidly.¹ Regional cooperation through the exchange of best practices, knowledge, experiences, lessons learned, and relevant data and information could support countries in efforts to align their low-carbon transport policies and achieve their respective climate goals. Such cooperation would enable countries to share experiences on new and emerging transport services, technologies and regulatory frameworks. The Regional Cooperation Mechanism on Low Carbon Transport and the Asia-Pacific Initiative on Electric Mobility, which were launched by ESCAP in 2022, could enhance collaboration among countries and stakeholder groups, especially the private sector.

The Regional Cooperation Mechanism is a specific activity included in the Regional Action Programme for Sustainable Transport Development in Asia and the Pacific (2022–2026) to help ESCAP member States **identify and develop policies for low-carbon mobility, clean energy technologies and logistics**. The objective of the Electric Mobility Initiative is to **provide expertise and technological know-how**,

and identify financial means to transition to net-zero carbon transport. The Initiative supports the acceleration of the transition to electric mobility through peer learning and sharing of experiences among private and public sector stakeholders.

Setting industries on a low-carbon pathway

Considering the heavy dependence on exported manufactured goods and the investment in manufacturing industries, Asia and the Pacific needs to use trade and investment to set industries on a low-carbon pathway. To achieve this in the domestic industrial sector and lower carbon intensity of international trade, the region needs to **expand climate-smart trade, including by incorporating climate-related provisions in RTAs and adapting non-tariff measures** to boost the positive impacts of trade on climate action. The incorporation of climate-related provisions could include binding commitments on fossil fuel subsidies and trade facilitation measures for environmental goods. This could set the ground for major trade partners to implement carbon pricing and carbon border adjustment taxes by major trade partners.

Foreign investment serves as a catalyst for the transfer of clean, low-carbon technology and financial resources, the development of climate friendly sectors, including renewable energy, and for setting major emitting sectors on a low-carbon pathway. However, FDI in climate-smart sectors in the region is low and uneven across countries. The majority of developing countries do not benefit from FDI. Accordingly, there is a great need to **promote regional cooperation on climate-smart investment to support developing countries in efforts to build national programmes and their capacity** to attract investors and pitch investment opportunities for developing low-carbon industries.

Enabling climate action

Upscaling climate finance

With current financial flows towards climate action falling significantly short of what developing countries need, a considerable scaling up of financing is needed in coming years. This requires a clearer and more coherent national policies and regulations to reduce investor risk, lower transaction costs and deploy capital towards climate action. **The adoption of sustainable finance road maps and green taxonomies, and the convergence and harmonization of national, regional and international sustainable finance regulations, disclosure requirements and project preparation practices** can help in this regard. Capacity-building for regulators, project developers and domestic and regional investors, which could be supported by regional cooperation, should also play a role in accelerating investment in climate finance projects.

Adequate financing for climate action requires a whole-of-government approach and private sector engagement. The recently announced JETPs of Indonesia and Viet Nam provide a good model of public and private-sector engagement to accelerate the mobilization of climate action, with lessons learned for the rest of the region to replicate. The JETPs platforms combine policy commitments on coal and energy transition with proposed regulatory improvements, donor capital and private finance, and have investor-advised councils that facilitate the preparation of genuinely bankable projects. **The creation of a regional fund that defrays the costs of preparation of low-carbon transition or energy-transition projects**, with a focus on small ticket-size projects, could help countries build more robust project pipelines and enhance their access to finance.

Strengthening monitoring capacity

Effective climate action by national, regional and global stakeholders requires internationally comparable climate-related information, including data on drivers, impacts and vulnerabilities, as well as mitigation and adaptation efforts. The Paris Agreement established ETF for monitoring climate action and support, which will be operationalized in 2024.² In addition to this reporting requirement, countries need to measure drivers and impacts of climate change and progress in mitigation and adaptation programmes in order to implement effective domestic actions and determine their socioeconomic implications. Producing the evidence to measure progress and inform climate action is a challenge for many countries. Using guidelines for ETF and the Global Set of Climate Change Statistics and Indicators, regional cooperation to **provide capacity-building could assist NSOs in developing national climate change statistical programmes to strengthen their capacity** to monitor climate change impacts, adaptation and mitigation actions, and produce climate change statistics.

Promoting policy dialogue and technical cooperation on national net-zero goals

While 39 countries in Asia and the Pacific have pledged carbon neutrality goals, the level of national implementation plans vary from an initial declaration of intent to formulating carbon neutrality laws or preparing strategies. Despite the pledges, developing LT-LEDS has been slow. Only 15 countries have submitted LT-LEDS, while some need to be further aligned with carbon neutrality goals that have been subsequently announced. However, convergence of NDCs in terms of sectoral approaches appears to be taking place regardless of the development stages of countries. In support of carbon neutrality goals, most countries plan to use NbS to protect, manage and restore ecosystems to increase carbon storage and avoid greenhouse gas emissions, which could be supported through regional cooperation.

The development and update of LT-LEDS and detailed sectoral plans could benefit from policy dialogue and technical cooperation at regional levels. New approaches and policies at the international level are constantly emerging outside the formal process of the Paris Agreement as multilateral

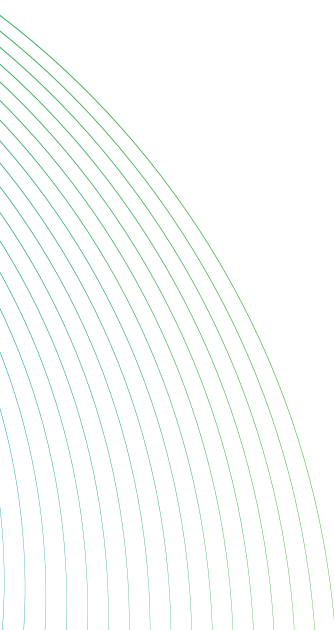
or voluntary initiatives. Most developing countries, however, have insufficient human and technical resources to keep abreast of these developments and reflect them in their national policies. **Regional policy dialogue and technical cooperation on low-carbon and climate-resilient transition** could be promoted through an open platform for governments and all key stakeholders including the private sectors.

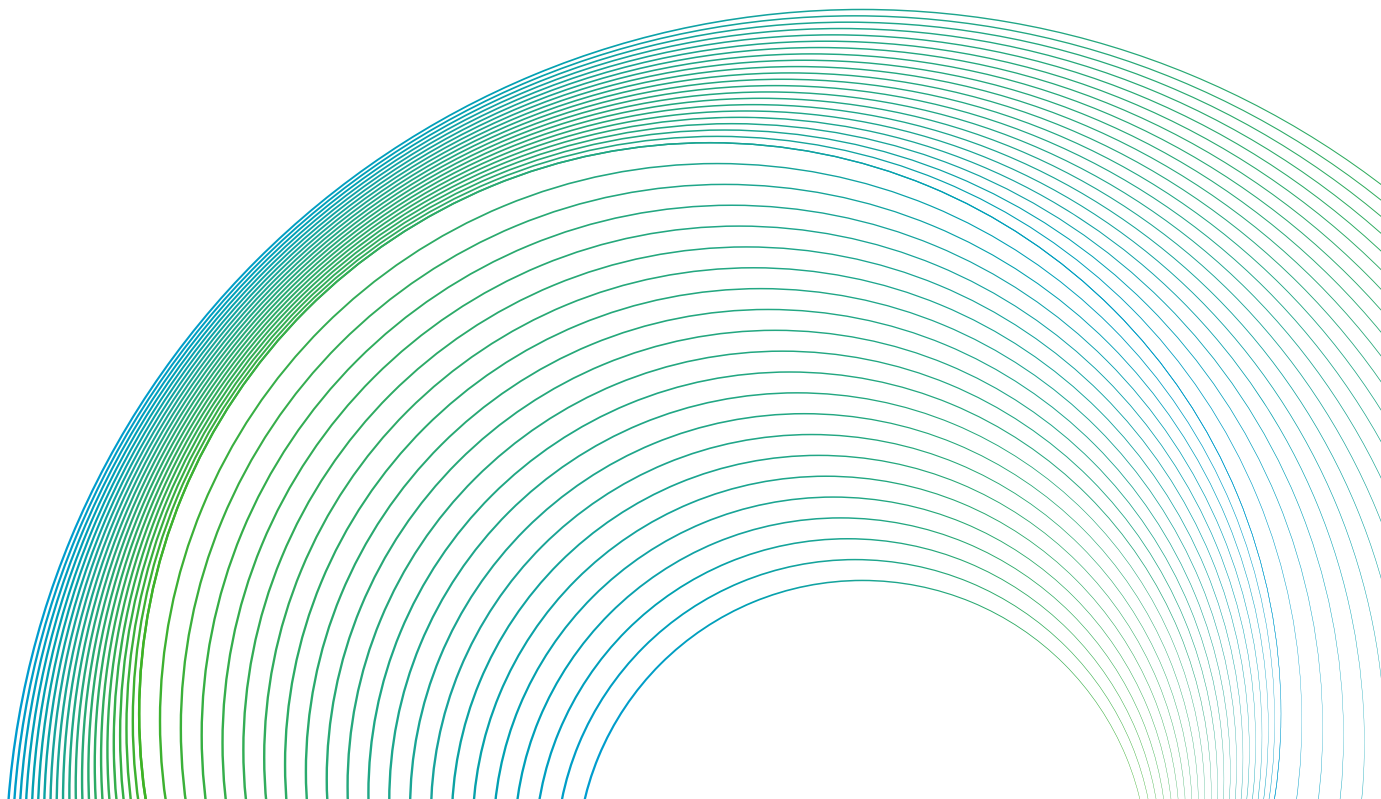
Such a cooperation could **cover broad policy frameworks for topics such as climate governance, technology and finance, and foster multisectoral collaboration** for initiatives related to energy, transport and industry. It could take an integrated approach to the mitigation and adaptation agendas, including through nature-based solutions. Many vulnerable countries require customized adaptation and resilience pathways that focus on risk-informed development policies and investments, frontier technologies and digital innovations to scale up transformative adaptation. Cooperation on strengthening resilience could benefit from coordination with regional and multilateral processes on the low-carbon transition.

The race to achieve net-zero emissions is on. Now is the time to join forces to accelerate climate action in Asia and the Pacific.

ENDNOTES

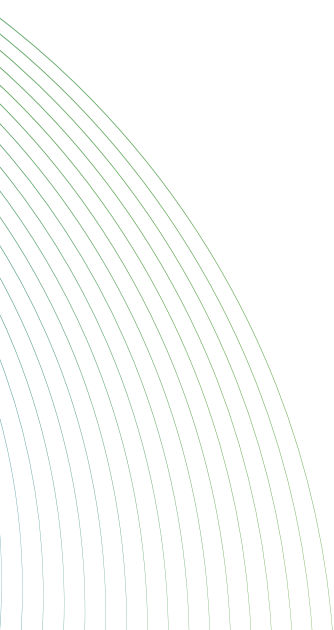
- 1 International Energy Agency, *Transport*.
- 2 United Nations Framework Convention on Climate Change, *Reference Manual for the Enhanced Transparency Framework under the Paris Agreement* (Paris, 2022).





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This report sets out the transformations that are needed for Asia and the Pacific to transition to a net-zero-carbon future in support of sustainable development.

To close the emissions gap in key sectors, energy transition away from fossil fuels to renewable sources of energy should be accelerated. Cross-border green power corridor could support countries to jointly scale up renewable energy. Low-carbon mobility and logistics are crucial for accelerating innovation, developing technologies and tapping into greener fuels beyond the transport sector. Climate-smart trade and investment should be utilized as force multipliers to promote low-carbon transition of industries but are still missing from the existing regional climate landscape.

To enable accelerated climate action, this report presents measures on improving policy environments to scale up climate finance and building national capacity to fill data gaps in measuring challenges and progress.

Given the carbon neutrality commitments from the majority of Asia-Pacific countries, the report recommends strengthening regional policy dialogue and technical cooperation on low carbon, climate resilient transition.

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