ASIA-PACIFIC TRADE AND INVESTMENT REPORT 2021

Accelerating Climate-smart Trade and Investment for Sustainable Development

ESCAP 75
MOVING FORWARD TOGETHER

UN environment programme 50 1972-2022

UNITED NATIONS
UNCTAD

*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.

The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment. Our mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

The United Nations Conference on Trade and Development (UNCTAD) is the focal point, within the United Nations system, for the integrated treatment of trade and development and interrelated issues in the areas of finance, technology, investment, services and sustainable development. Globalization, including a phenomenal expansion of trade, has helped lift millions out of poverty. But not nearly enough people have benefited. And tremendous challenges remain. UNCTAD supports developing countries to access the benefits of a globalized economy more fairly and effectively. It provides analysis, facilitates consensus-building, and offers technical assistance. This helps them to use trade, investment, finance, and technology as vehicles for inclusive and sustainable development.

** The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.*

ASIA-PACIFIC TRADE AND INVESTMENT REPORT 2021

Accelerating Climate-smart Trade and Investment for Sustainable Development

UNITED NATIONS

United Nations
Economic and Social Commission
for Asia and the Pacific

United Nations
Environment Programme

United Nations Conference on Trade
and Development

United Nations Economic and Social Commission for Asia and the Pacific

United Nations Environment Programme

United Nations Conference on Trade and Development

ASIA-PACIFIC TRADE AND INVESTMENT REPORT 2021

Accelerating Climate-smart Trade and Investment for Sustainable Development

United Nations publication
Sales No. E.21.II.F.14

ISBN: 9789211208320
e-ISBN: 9789210010016
Print ISSN: 2522-2597
eISSN: 2221-500X
ST/ESCAP/2970

Reference to dollars ($) are to United States dollars unless otherwise stated.

A space is used to distinguish thousands and millions.

Bibliographical and other references have, wherever possible, been verified.

The United Nations bears no responsibility for the availability or functioning of URLs.

The views expressed in this publication are those of the authors or case study contributors and do not necessarily reflect the views of the United Nations.

The opinions, figures and estimates set forth in this publication are the responsibility of the authors and contributors, and should not necessarily be considered as reflecting the views or carrying the endorsement of the United Nations. Any errors are the responsibility of the authors.

Mention of firm names and commercial products does not imply the endorsement of the United Nations.

The *Asia-Pacific Trade and Investment Report* and supporting online documents are the sole responsibility of the ESCAP, UNEP and UNCTAD secretariats. Any opinions or estimates reflected herein do not necessarily reflect the opinions or views of Members and Associate Members of ESCAP, UNEP and UNCTAD.

FOREWORD

It is high time to make international trade and investment climate smart. While globalization has lifted billions of people out of poverty in the Asia-Pacific region alone, the economic growth supported by existing trade and investment policies has come at a steep environmental cost. The latest report by the Intergovernmental Panel on Climate Change unequivocally concludes that a human-made climate crisis is unfolding and that we are on the verge of a tipping point. All possible avenues need to be considered in reducing greenhouse gas emissions, including in the policies governing trade and investment.

As explained in this timely report – a joint effort by ESCAP, UNCTAD and UNEP – the links between trade, investment and climate change are complex. The key is to ensure that the positive effects of trade and investment are maximized, such as by promoting trade and investment in renewable energy and low-carbon technologies, while minimizing the adverse effects, such as by digitalizing trade and transport systems.

The Asia-Pacific region has become the largest emitter of greenhouse gases in absolute terms and the report finds much room for all economies to make the trade and investment more climate-smart. As key trade partners consider putting border taxes in place on carbon, there are strong concerns on the effects on the developing countries since many economies in the region are at risk of being pushed out of key markets. The roll-out of COVID-19 recovery packages need to provide opportunities to invest in low-carbon technologies and sectors, opportunities that should not be missed considering the urgency for action. The international community has a big role to play to honour their commitments by providing access to much needed technology and financing for developing countries.

While implementing climate-smart policies comes at a significant cost, particularly for carbon-intensive sectors and economies, the cost of inaction is far greater. Strengthened multilateral and regional cooperation, proactive domestic regulatory reform, as well as effective private sector engagement will be essential to ensure that the economic transformation needed to mitigate the climate crisis takes place and that those most affected are not left behind. ESCAP, UNCTAD and UNEP look forward to supporting this process.

Inger Andersen
Executive Director, UNEP

Armida Salsiah Alisjahbana
Executive Secretary, ESCAP

Rebeca Grynspan
Secretary General, UNCTAD

ACKNOWLEDGEMENTS

The Asia-Pacific Trade and Investment Report (APTIR) 2021: Accelerating Climate-smart Trade and Investment for Sustainable Development was prepared under the overall guidance of Yann Duval, Officer-in-Charge, Trade, Investment and Innovation Division of the Economic and Social Commission for Asia and the Pacific (ESCAP), Dechen Tsering, Regional Director and Regional Representative for Asia and the Pacific (UNEP), Steven Stone, Chief, Resources and Markets Branch, Economy Division (UNEP), Anja von Moltke, Head of the Environment and Trade Hub of the United Nations Environment Programme (UNEP), and Jan Hoffmann, Chief, Trade Logistics Branch of the United Nations Conference on Trade and Development (UNCTAD).

Under the substantive direction of Yann Duval, the core team of ESCAP authors included the following Trade, Investment and Innovation Division staff members: Alexey Kravchenko (chapters 1, 2, 6 and 7); Marit Nilses (chapter 3) and Yann Duval (chapter 7). Tientip Subhanij, Jonathan Wong and Heather Lynne Taylor-Strauss provided substantive inputs and peer review. Maria Semenova, ESCAP consultant, contributed significantly to the construction of the Climate-smart Trade and Investment Index and text analysis of regional trade agreements (chapter 2 and 4). Anna Strutt, Erwin Corong, and Maksym Chepeliev conducted the CGE impact analysis presented in chapter 6. Under the substantive direction of Frida Youssef and Poul Hansen, the core team of UNCTAD authors were Celine Bacrot and Luisa Rodriguez (chapter 5). Under the substantive direction of Anja von Moltke, the core team of UNEP authors were Mushtaq Ahmed Memon (chapter 3) and Stacey Mills (chapter 4).

Several ESCAP interns and individual contractors provided substantive research and drafting input into the report, including Runqiu Du (chapter 1), Shreya Sonalker and Kuan-Yu Su (chapter 3), Simon Hardy (chapter 5) and Victoria Ware (chapter 6); Jiahui Zong and Alexandre Nicolas Boisseau, also provided assistance with underlying research, referencing and manuscript preparation. From UNEP, Jayasurya Kalakkal provided review and support.

The report benefited greatly from feedback and suggestions received during the Expert Group Meeting on “Climate-Smart Trade and Investment for Sustainable Development”, 18, 19 and 22 June 2021, from the following discussants (in order of scheduled interventions): Aik Hoe Lim, Mia Mikic, Jean-Frédéric Morin, Colette van der Ven, Shunta Yamaguchi, Mikael Lind, Alan McKinnon, Stanley Trief, Aneta Nikolova, Radhika Mehrotra, Ralf Peters, Charlotte Frater, and Azhar Jaimurzina Ducrest. The report and underlying research work further benefited from review and suggestions by Kaveh Zahedi, Witada Anukoonwattaka, Michael Williamson, Matthias Helble, and Will Martin, as well as from Hamza Ali Malik, Petra Nahmias, Sabine Henning and Ruhimat Soerakoesoemah.

Alan Cooper edited the report and Charuwan Chongsathien and Nucharat Tuntiwigit of the Trade, Investment and Innovation Division performed final checks, checked references and citations, and supervised the formatting of the report. The graphic concept, design and layout were carried out by Arom Sanguanyuang. The Strategic Communications and Advocacy Section collaborated in disseminating and communicating the findings of the report through media outlets, and Chaveemon Sukpaibool arranged for the timely online publication and ensured that the report is accessible by readers worldwide.

CONTENTS

CONTENTS *(continued)*

LIST OF BOXES

CONTENTS *(continued)*

LIST OF FIGURES

CONTENTS *(continued)*

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

ACCTS	Agreement on Climate Change, Trade and Sustainability
ADB	Asian Development Bank
AIGCC	Asia Investor Group on Climate Change
APEC	Asia-Pacific Economic Cooperation
APTIR	Asia-Pacific Trade and Investment Report
ASEAN	Association of Southeast Asian Nations
ASYCUDA	Automated System for Customs Data
ASYSPS	ASYCUDA Sanitary and Phytosanitary
BCA	border carbon adjustment
BSR	Business for Social Responsibility
BTA	border tax adjustment
CAC	Concrete Action for Climate
CBAM	carbon border adjustment mechanism
CBD	Convention on Biological Diversity
CDP	Carbon Disclosure Project (ONLY USE CDP)
CDSB	Climate Disclosure Standards Board
CFCs	chlorofluorocarbons
CGE	computable general equilibrium
CH4	methane
CII	Carbon Intensity Indicators
CLEG	Combined List of Environmental Goods
CO2	carbon dioxide
CPLC	Carbon Pricing Leadership Coalition
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CSIS	Center for Strategic and International Studies
DETEC	Federal Department of the Environment, Transport, Energy and Communications
EASI	enable-avoid-shift-improve
ECIU	Energy and Climate Intelligence Unit
EEDI	Energy Efficiency Design Index
EFTA	European Free Trade Association
EGA	Environmental Goods Agreement
EIA	Energy Information Administration
EIB	European Investment Bank
EPA	Environmental Protection Agency
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESG	environmental, social and governance
ETSs	emission trading scheme
EU	European Union
EV	electric vehicle
FDI	foreign direct investment

GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GB	gigabytes
GCCA	Global Cement and Concrete Association
GDP	gross domestic product
GHG	greenhouse gas
GRI	Global Reporting Initiative
GSIA	Global Sustainable Investment Alliance
GT	gigatonnes
GTAP	Global Trade Analysis Project
GTCO2	gigatonnes of CO2 emissions
GWP	global warming potential
HLCCP	High-Level Commission on Carbon Prices
HS	harmonized system
ICNTM	International Classification of Non-tariff Measures
ICT	information and communication technologies
ICTSD	International Centre for Trade and Sustainable Development
IEA	International Energy Agency
IETA	International Emissions Trading Association
IFRS	International Financial Reporting Standards
IGCC	Investor Group on Climate Change
IEEFA	Institute for Energy Economics and Financial Analysis
IIRC	International Integrated Reporting Council
IISD	International Institute for Sustainable Development
IMO	International Maritime Organization
IPCC	International Panel on Climate Change
ISDS	investor-state dispute settlement
ISO	International Organization for Standardization
ITC	International Trade Centre
ITF	International Transport Forum
JIT	just in time
JTM	Just Transition Mechanism
LEED	Leadership in Energy and Environmental Design
LNG	liquified natural gas
MEAs	multilateral environmental agreements
MT	millions of tonnes
MTCO2	metric tonnes of CO2
MW	megawatt
N2O	nitrous oxide
NDC	nationally determined contribution
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
NTBs	non-tariff barriers
NTFCs	National Trade Facilitation Committees
NTM	non-tariff measure
NZAS	New Zealand's Aluminum Smelter
OECD	Organisation for Economic Co-operation and Development

PACER	Pacific Agreement on Closer Economic Relations
PBEC	Pacific Basin Economic Council
PRI	Principles for Responsible Investment
PTA	preferential trade agreement
PV	photovoltaics
RCP	representative concentration pathway
RECAP	Regional Project Energy Security and Climate Change Asia-Pacific
RECEP	Regional Comprehensive Economic Partnership
RTA	regional trade agreement
SASB	Sustainability Accounting Standards Board
SBTi	Science Based Target initiative
SDG	Sustainable Development Goals
SMARTII	Climate-smart Trade and Investment Index
SPS	sanitary and phytosanitary
SSATP	Africa Transport Policy Program
TBT	technical barriers to trade
TCFD	Task Force on Climate-related Financial Disclosures
tCO2	tonnes of CO2 emissions
TFA	Trade Facilitation Agreement
TIP	Trade Information Portal
TRAINS	Trade Analysis Information System
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNODC	United Nations Office on Drugs and Crime
WBCSD	World Business Council for Sustainable Development
WCO	World Customs Organization
WEF	World Economic Forum
WITS	World Integrated Trade Solution
WMO	World Meteorological Organization
WRI	World Resource Institute
WTO	World Trade Organization
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

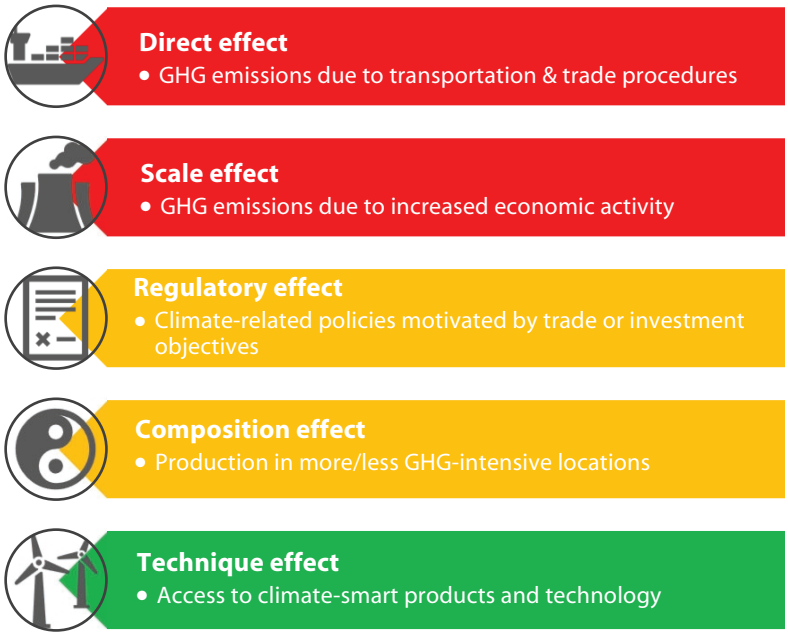
Trade and investment need to be climate smart

International trade and investment have been indispensable engines of economic growth in Asia and the Pacific and remain essential means of implementation for achieving the 2030 Agenda for Sustainable Development. However, this economic growth has come with significant social and environmental costs, including the rapidly worsening climate crisis. This report looks at how "climate-smart" trade and investment-related policies can help address climate change, taking into account the ongoing COVID-19 pandemic.

Even though climate action is an integral part of the 2030 Agenda, most explicitly addressed in Sustainable Development Goal 13, the Asia-Pacific region has regressed on this Goal. Between 1990 and 2018, while global greenhouse gas (GHG) emissions increased by nearly 50 per cent, in the Asia-Pacific region, they more than doubled. Despite the region being known as the "factory of the world", the primary source of growth in emissions is increased consumption, in line with rising standards of living in developing countries. Still, **there is an urgent need for economies in the region to reduce GHG emissions, including to maintain their trade competitiveness as carbon taxes at borders become more likely.**

"Climate-smart" trade and investment policies are defined as all government regulations aiming to reduce or limit net GHG 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 GHG emissions. Other "climate-smart" trade and investment policies include liberalizing trade in environmental goods and services, addressing cross-border trade inefficiencies, emissions standards of imports, non-tariff measures (NTMs), and addressing other wasteful subsidies.

Effects of trade and investment on greenhouse gas emissions



Trade and investment have a complex relationship with climate change. While transportation and increased economic activity due to trade tend to increase GHG emissions, trade is also crucial for spreading technologies to attain 'green' economies and reduce emissions. Some impacts are less clear-cut. What products a country specializes in producing may also affect their overall emissions. This can be net beneficial to climate action if a country with a greener energy system produces more energy-intensive products, but it could also be detrimental if a country seeks to produce similar products in a less environmentally friendly way.

How climate-smart is trade and investment in Asia and the Pacific?

According to ESCAP research, all economies in the region have significant room for making their trade and investment more climate-smart. **Barriers to trade in environmental goods 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 appear to be lower than those on environmental goods. Apart from a few notable exceptions (Japan, Kyrgyzstan, the Lao People's Democratic Republic, the Philippines and Nepal), 21 out of the 26 economies examined applied more non-technical NTMs on imports of environmental goods than on imports of carbon-intensive fossil fuels.

More concerning is that, on average, **Asia-Pacific economies have increased the share of carbon-intensive fossil fuels in their trade since 2015**. Wasteful and regressive fossil fuel subsidies continue to contribute to GHG 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 the reduction in emissions.

Progress towards a climate-friendly investment environment has been mixed. **In more than half of the economies in the region, the share of coal in electricity generation has increased since 2015**. The Asia-Pacific region accounts for 75 per cent of the global coal-fired generation capacity. However, many economies in the region have a large share of renewable energy in electricity generation; a share that has increased since 2015. Some reports suggest that fossil fuel power demand has peaked globally, and that it is now more cost-effective to invest in green power.

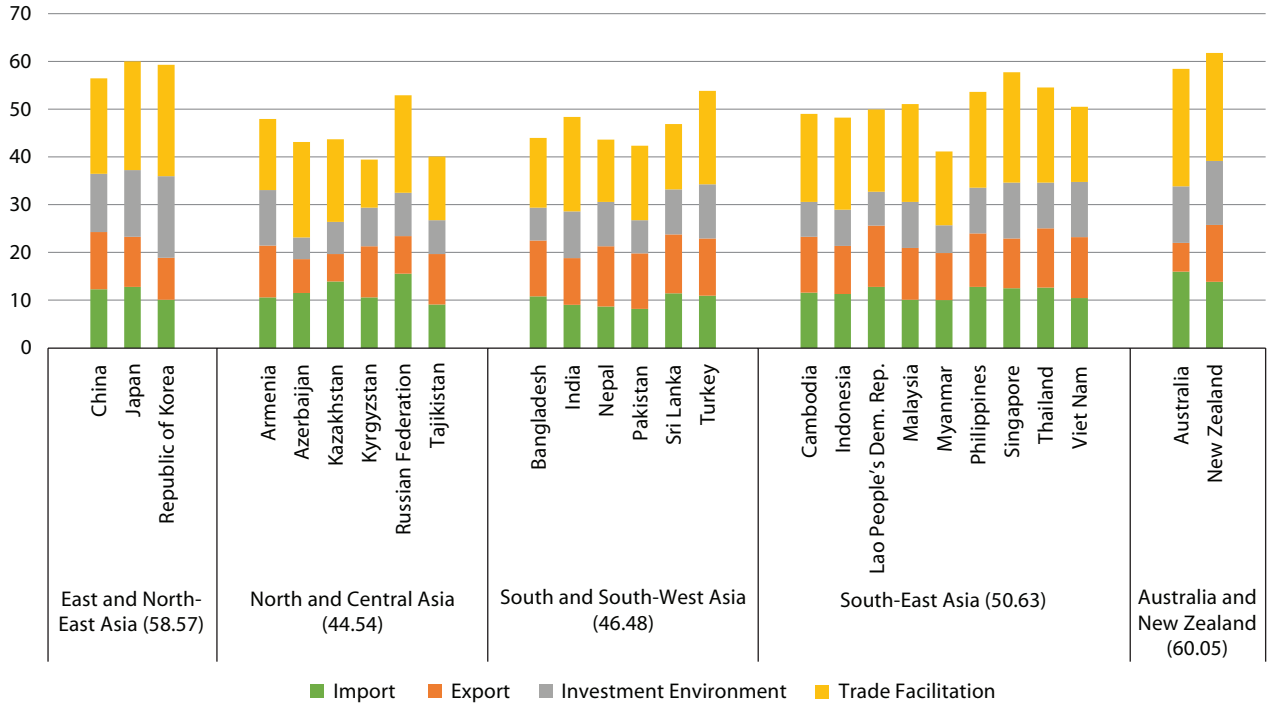
While many countries in the region have set mandatory emissions standards on imports of vehicles, require energy ratings labels and ban trade in chlorofluorocarbons (which are potent GHGs), more should consider doing so, as well as taking additional steps to address trade in illegal timber (which contributes to deforestation). Mandatory requirements of climate-friendly production processes may run contrary to the current non-discriminatory principles of the World Trade Organization (WTO). In such cases, Governments may encourage voluntary eco-labelling in lieu of imposing NTMs.

On the positive side, ESCAP analyses show that there has been steady progress in trade facilitation in the Asia-Pacific region. The transparency and efficiency of trade procedures have improved significantly since 2015, and the latest data from the UN Global Survey on Digital and Sustainable Trade Facilitation confirm that the region continued to advance between 2019 and 2021. While much remains to be done, implementation of cross-border paperless trade – the electronic exchange and legal recognition of trade-related data and documents across borders – has picked up. This can be partly attributed to the COVID-19 pandemic and the resulting physical distancing requirements.

Climate-smart business and investment

Climate pledges by several countries in the region need to be underpinned by policies and measures to drive the transformation towards lower carbon economies, including in the private sector. Such a transformation would facilitate a surge in investments, including in clean energy and energy efficiency measures in the industrial, building and transport sectors. These investments, in turn, would drive structural change in which jobs in old industries are replaced by those in new sectors. **Recent estimates suggest**

Climate-smart trade and investment index scores, by subregion, 2019



Source: ESCAP Climate-smart Trade and Investment Index (SMARTII).

that 16 million new jobs would be created in clean energy, energy efficiency, engineering, manufacturing and construction industries, more than compensating for the estimated loss of five million jobs by downscaling industries.

While government policies, such as carbon pricing and energy performance standards, are key to driving this transformation, ambitious corporate action is also needed to proceed at the scale and pace required. To integrate climate considerations into business decisions, companies may adopt internal carbon prices, publish transparent sustainability reports and disclose emissions, and commit to emission reduction goals in line with a 1.5-degree trajectory. Notably, such private sector action to reduce emissions is increasing in the region – albeit from a low level – in particular with regard to sustainability reporting.

Moreover, as the world moves towards a net-zero economy, **the finance sector will need to enable this transformation by ensuring that climate and environmental factors are fully integrated into financial decision-making**. However, while financial institutions increasingly launch sustainable finance products, only a quarter of surveyed financial institutions disclose their portfolio emissions, and less than half align their portfolios well below the 2 degrees pathways. This is likely to increase, as the net-zero movement is picking up steam through initiatives, such as the Principles for Responsible Banking and the UN-convened Net-Zero Banking Alliance, both of which have emerged in the past couple of years. Another important development is that over the past few years, more and more financial sector actors – government, multilateral development banks and private sector entities – have declared their intention to stop funding coal and other fossil fuels.

Regional trade agreements: tools to promote climate-smart trade

Regional trade agreements can help address climate change. The number of such agreements involving countries in Asia and the Pacific region has increased rapidly, with more than 200 having been signed or entered into force and another 95 under negotiation, as of December 2020. These agreements typically go

beyond commitments made under WTO agreements, making them useful for dealing with environmental issues, including climate change. **Over time, there has been a general trend towards including a higher number of environmental provisions in regional trade agreements, broadening their scope and deepening their stringency.**

The vast majority – 85 per cent – of the regional trade agreements signed after 2005 by at least one Asia-Pacific economy contain one or more climate-related provisions. The agreements with the most climate-related articles and that include an Asia-Pacific economy most often involve the European Union, the Republic of Korea and Japan. While the empirical evidence of the impact of environmental provisions in regional trade agreements is minimal, it does suggest that such provisions do not substantially reduce exports from developing countries, but they do promote "green exports".

Climate-related provisions vary greatly across agreements and are typically statements of intent or cooperation, with few concrete, binding commitments. **In the Asia-Pacific region, regional trade agreements mainly call for climate action (34 per cent) or promote environmental goods, services and technologies (27 per cent). Very few refer to fossil fuel subsidies or carbon markets.** The two new mega-regional trade agreements, the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), vary markedly in terms of their level of ambition in this area. RCEP hardly deals with the environment or climate change. In contrast, CPTPP contains provisions requiring Parties to effectively enforce domestic environmental laws and prohibiting the loosening of environmental laws to encourage trade and investment.

Looking to the future, countries could use regional trade agreements to realize climate goals by including provisions covering climate-friendly public procurement, carbon markets and border carbon adjustment taxes, and the limiting of fossil fuels. **To be effective, climate-related provisions should specify more precise, measurable and binding commitments.** Regional trade agreements should also incorporate credible mechanisms for the enforcement of these provisions. In addition, including commitments in the agreements to reduce tariff and non-tariff barriers to trade on environmental goods and services and incorporating binding commitments on reducing environmentally harmful subsidies, including fossil fuel subsidies, would be a good starting point.

Climate-smart trade and transport facilitation

The link between trade facilitation and climate change is not well recognized. Multilateral and regional trade facilitation agreements do not seek to exploit the potential synergies between trade facilitation and climate change efforts. **Trade facilitation – in addition to boosting trade – can also help mitigate the negative impacts on climate by making the trade transaction process less carbon intensive.** As e-commerce and the COVID-19 pandemic has led to explosive growth in shipments of small parcels across borders, reducing carbon emissions associated with trade procedures has become even more important.

There is evidence that **digital trade facilitation, such as implementation of automated customs and paperless trade systems, can contribute to reducing carbon dioxide (CO2) emissions**. For example, the electronic single window in Vanuatu reduced CO2 emissions by 5,827 kg by eliminating the use of papers in two trade procedures. Trade information portals have also been found to be an efficient tool in reducing energy consumption as they increase transparency and make it easier for traders to access the information needed to fulfil administrative trade requirements.

In addition to lowering the costs of sourcing emission-intensive goods from producers with a smaller GHG emissions footprint, trade facilitation can also ease trade in environmental goods – essential for addressing climate change. The critical role of trade facilitation in the movement of essential goods became evident during the early stages of the COVID-19 pandemic when countries scrambled to facilitate trade in personal protective equipment. **Facilitation measures put in place for essential goods during the pandemic may be extended to environmental goods to address the climate crisis.**

As a major consumer of oil, transport typically accounts for the largest portion of emissions associated with any given trade transaction.[1] Freight transport contributed about 6 per cent of global GHG emissions, on average, over the past decade, with road transport accounting for the largest share. Reductions in transport emissions comprised more than half of the historic fall in global energy-related CO2 emissions during the first year of the COVID-19 crisis in 2020 (-5.8 per cent).

Regulation of transport emissions is increasing and transitioning towards climate-smart transport entails significant changes in transport operations. Reducing emissions in this sector is particularly difficult as it is the least diversified energy end-use sector, there is continuous growth of global demand for transport, and there are technical limitations to replacing oil-based fuels. The Enable-Avoid-Shift-Improve (EASI) framework presented in chapter 5 of this report can help identify mitigation options when designing transport policy measures.

Digitalizing transport networks has become a priority in the Asia-Pacific regional policymaking agenda, as a result of the COVID-19 crisis, with significant potential to reduce emissions and increase trade resilience. For example, under the Association of Southeast Asian Nations regional recovery guidelines, digitalized and smart solutions are identified as a priority to shift towards sustainable transport. **Regional approaches play an important role in shifting towards more sustainable and resilient transport systems and in leveraging digitalization** to address interoperability issues and additional costs and threats arising from diverging technical and operational standards.

The impact of switching to climate-smart trade and investment

Tackling climate change, including through climate-smart trade and investment, comes with a significant price tag. The costs of inaction, however, are estimated to be orders of magnitude greater, by some estimates as high as $792 trillion by 2100 if the Paris Agreement targets are not met. **Cutting fossil fuel subsidies to provide a level playing field for trade and investment in cleaner energies is estimated to reduce global emissions by 3.2 per cent; a much more significant reduction than existing carbon price schemes.** As real GDP does not decline when subsidies are removed, eliminating global subsidies brings a win-win situation with gains in economic welfare accompanying reductions in emissions. Reducing fossil fuel subsidies would increase real GDP in all subregions of the Asia-Pacific region except North and Central Asia, which is heavily dependent on fossil fuel production and exports.

Modelling the impact of existing carbon pricing schemes reveals that they reduce global GDP by $46 billion, while reducing GHG emissions by only 2.18 per cent. Almost half of the effect in emissions is due to schemes within the European Union + region. The largest cuts in emissions in the Asia-Pacific region have been in East and North-East Asia where several countries have implemented national carbon pricing schemes. All subregions have benefited from increased investment from existing carbon pricing schemes.

The limited impact of these schemes on emission is explained by their limited implementation. **As of June 2021, approximately 21.5 per cent of global GHG emissions – and only 7.8 per cent of emissions in Asia and the Pacific – were covered by some sort of carbon pricing initiatives, with a global average price estimated at $2 per ton of CO2.** Carbon prices of existing schemes vary from $1 to $100 and the schemes also vary greatly in terms of coverage of emissions. For example, the scheme deployed by Japan covers more than 75 per cent of total emissions, whereas existing state-level schemes in the United States cover only 5 per cent of the country's emissions.

[1] As highlighted throughout report, emissions from international transport only reflect part of the carbon footprint of global trade. Production methods, storage and disposal methods also play a role in understanding the carbon footprint of traded goods.

A potential consequence of carbon pricing policies implemented in one country or region is carbon leakage, which occurs when high emission production activities move to economies with less stringent policies. Some governments, particularly the European Union,[2] are either discussing or proposing the introduction of carbon border tax adjustments (BTAs), which are also aimed at addressing the concerns of producers whose competitiveness is eroded by carbon pricing when competitors are not similarly taxed. EU+ carbon pricing schemes contribute to a reduction of 360 tons of CO2, whereas resultant carbon leakages represent about 12 per cent of that amount.

The economies in Asia and the Pacific that have in place carbon pricing schemes are estimated to experience relatively small increases in emissions due to existing European Union+ pricing schemes. Nevertheless, modelling results show that BTAs are effective at stemming carbon leakages. The increases in emissions in least developed countries expected to be exempted from EU+ BTAs total less than half a ton of CO2.

A global carbon pricing scheme would make BTAs unnecessary. Setting a global carbon price would reduce emissions much more effectively for a much smaller economic cost than unilateral carbon prices in myriad unconnected schemes. Imposing a global carbon price of only $10 is estimated to reduce emissions in the Asia-Pacific region much more significantly than existing unilateral and regional schemes – at a cost of 0.07 per cent of real GDP. Still, **a global carbon price greater than $50 and covering more than half of global emissions would be necessary to keep global warming under 2°, highlighting the need to exploit all possible strategies to reduce emissions**.

Carbon pricing and elimination of fuel subsidies will have a greater impact on the economies that rely heavily on fossil fuel and carbon-intensive manufacturing sectors. Marked negative employment effects in the carbon-intensive fuel sectors can be expected, indicating a need for stronger social safety nets and multilateral cooperation to ensure that "no one is left behind".

CONCLUSION AND RECOMMENDATIONS

Urgent action is needed to tackle the climate crisis. **Climate-smart considerations need to permeate activities and decisions by all actors and are starting to do so, including in the areas of trade and investment.** Climate policies implemented outside of the region will also affect Asian and Pacific economies. A proactive approach by countries to prepare their economies for this new market environment, supported by regional and multilateral cooperation, is recommended. Tangible policy recommendations discussed throughout the report that countries may consider include the following:

(a) ***Liberalize trade in climate-smart and other environmental goods and services***. This can be done unilaterally or as part of regional or multilateral initiatives.

(b) ***Phase out fossil fuel subsidies***. Importantly, to be successful, the phasing out process needs to ensure that the most vulnerable segments of society relying on such subsidies are supported in other ways.

(c) ***Adopt climate-smart non-tariff measures and encourage voluntary eco-labelling***. Such measures can include, among others, requirements pertaining to energy performance, emissions from cars, and certification of legal and sustainable sourcing of timber. Additionally, Governments may want to encourage the adoption of relevant voluntary sustainability standards, such as eco-labelling of emission-intensive good and food products.

[2] The European Union proposes, in its July 2021 package to support climate targets, a carbon border adjustment mechanism to reduce carbon leakage by equalizing the carbon price between domestic and imported products in key industries. This is a type of border tax adjustment that is intended to increase climate mitigation efforts that are compatible with the World Trade Organization. (https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661).

(d) ***Encourage climate-smart investment and private sector initiatives***. Governments can play an important catalyst role and lead by example by directing the investment bodies under their control to reorient their funds towards investing in low carbon businesses. They can also 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 degrees.

(e) ***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.

(f) ***Transition to climate-smart transport***. Digitalization of transport processes also holds great promise to reduce emissions by optimizing utilization of existing logistics infrastructure. Regional cooperation is important to ensure that new policies and regulations are put in place to support the transition to more climate-friendly international transport systems.

(g) ***Incorporate climate considerations in regional trade agreements***. Governments in the region should explore how regional trade agreements 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.

(h) ***Prepare for carbon pricing and carbon border adjustment taxes***. Unilateral or regional carbon pricing mechanisms can help economies in the region prepare for potential border carbon adjustment taxes. Carbon pricing instruments can also be a powerful component of post-COVID-19 recovery packages which could simultaneously address greenhouse emissions and raise much needed revenue. The proceeds from carbon pricing schemes should be channeled towards green growth and the circular economy as well as to help those most affected by the schemes.

CHAPTER

Trade, investment, climate change and the SDGs: Why trade and investment need to be climate smart

International trade and foreign direct investment are key means of implementation of the 2030 Agenda for Sustainable Development. They have been indispensable engines of growth for both developed and developing economies, in particular in Asia and the Pacific. At the same time, the rapid economic development that trade and investment have enabled is increasingly seen to be unsustainable, and the social and environmental dimensions of development need to be more fully accounted for.

As already noted in the *Asia-Pacific Trade and Investment Report 2017: Channelling Trade and Investment into Sustainable Developmen*t, expecting gains from free trade and investment will be used to address social imbalances and rehabilitate the environment is unrealistic and insufficient (ESCAP, 2017). It is, therefore, important to implement sustainable development-targeted trade and investment supplementary policies to ensure that trade and investment more directly contribute to sustainable development. This report's main focus is how such supplementary policies can help to address climate change, taking into the account the aftermath of the COVID-19 pandemic.

> *"Free trade and investment alone are not enough to address social imbalances and rehabilitate the environment."*

Predicting the main driving forces, impact and ways to address climate change is a contentious and complex task. Nevertheless, it is generally agreed that greenhouse gas emissions (GHG) from human activities are the main driving force of climate change. The latest report by the International Panel on Climate Change (IPCC, 2021) provides undisputable scientific evidence in this regard. To have a good chance to reach the Paris Agreement goal of limiting global temperature rise to 1.5 degrees above pre-industrial levels and prevent the worst impacts of climate change, carbon dioxide (CO2) emissions will need to peak in 2020, halve by 2030 and reach net-zero by 2050, translating to approximately 5 to 7 per cent reductions in CO2 annually.

The consequences of climate change include raising sea levels, increased frequency of extreme weather events, decreased agricultural productivity, water shortages, loss of biodiversity, among many others negative effects (IPCC, 2021).[1] As such, climate change has already negatively affected billions of people in the Asia-Pacific region, particularly the most vulnerable, and it is predicted to get worse (ESCAP, 2021; IPCC, 2014a). To address climate change, in 2015, 196 Parties agreed to aim to limit warming to below 2, preferably 1.5, degrees Celsius, compared to pre-industrial levels, primarily through reducing GHG emissions. As of 2020, however, nationally determined contributions (NDCs) are insufficient to reduce GHG emissions enough to limit global warming to well below 2°C above pre-industrial levels (IPCC, 2021).

> *"Climate change has negatively affected billions of people in the Asia-Pacific region, particularly the most vulnerable, and it is only predicted to get worse."*

The COVID-19 pandemic has had a significant impact on global economic activity and emissions, particularly in industries that are traditionally seen as the main GHG emitters. It is estimated that in 2020, global energy-related CO2 emissions fell by 5.8 per cent, the largest decline since World War II (IEA, 2021). At the same time, that year was the warmest on record, tied with 2016 (WMO, 2021). Notably, 2016 experienced the warming phase El Niño, while 2020 was under La Niña cooling condition (WMO, 2021). More concerning is that, despite the COVID-19 crisis, energy-related CO2 emissions towards the end of 2020 not only rebounded but surpassed their levels at the same time of the year in 2019 (IEA, 2021). This underlies the urgent need to accelerate efforts to address climate change.

> *"Despite the COVID-19 crisis, energy-related CO2 emissions towards the end of 2020 not only rebounded but surpassed their levels at the same time of the year in 2019."*

Much like COVID-19, climate change knows no borders. Emissions in one country have a very real impact on other countries. The collective impact on global emissions is complicated by transmissions through international trade and investment under which hard-won policy-driven advances in GHG emissions reductions in one country may be offset by increases in others through shifting production and trade patterns. Greater international trade generally implies more emissions due to fossil fuel consumption during transportation. These emissions may be either offset or exacerbated, depending on whether production processes in the country of origin are less or more polluting. Trade-related transportation emissions may be reduced through greater trade facilitation. At the same time, trade and investment are essential for manufacturing and

[1] Indeed, one study went as far as to suggest that emergence of SARS-CoV-1 and SARS-CoV-2 viruses was in part caused by shifts in global biodiversity driven by climate change (Beyer, Manica, and Mora, 2021).

diffusion of green technologies, and environmental provisions in trade agreements are starting to address climate change to supplement multilateral efforts. This report aims to examine the complex landscape of linkages between trade, investment and climate change in the context of wider consideration of sustainable development and the COVID-19 aftermath and provide climate-smart trade and investment policy recommendations based on current best-practices.

"Like COVID-19, climate change knows no borders, and emissions in one country have a very real impact on other countries."

This introductory chapter gives a backdrop for the subsequent discussion and policy recommendations. It is structured as follows: section A provides an overview of climate change impact in Asia and the Pacific vis-à-vis the 2030 Agenda and an outline of the region's GHG emissions and patterns; section B defines "climate smart" trade and investment policies in the context of the rest of the report; section C examines the theoretical links between trade, investment and climate change and section D concludes.

A. EFFECTS OF CLIMATE CHANGE IN ASIA AND THE PACIFIC IN THE CONTEXT OF SDGs

Climate change and the vulnerability of the Asia-Pacific region

Climate change is "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (IPCC, 2018). The Intergovernmental Panel on Climate Change (IPCC) reported, since the early twentieth century, unprecedented climate changes were observed and proven by abundant empirical evidence as the result of human activities (IPCC, 2014a; WMO, twentieth; IPCC, 2021). Among other impacts, human activities, especially fossil fuel burning, have been significantly raising the atmospheric concentration of greenhouse gas (GHG), resulting in a global temperature increase, referred to as global warming. Human-induced global warming leads to rising sea levels; ice loss at poles and in mountain glaciers and extreme weather events, such as wildfires, droughts, floods etc.

"Climate change is making the Asia-Pacific region more hazardous."

The global mean surface temperature in 2020 was 1.25°C higher than in the pre-industrial period of 1850-1900, indicating the difficulty in achieving the goal agreed by the Paris Agreement (WMO, 2021). Scientific research has shown that climate change impacts and risks, such as threats to ecosystems and extreme weather events, would be aggravated severely by just a slight increase from global warming of 1.5 to 2°C (IPCC, 2014a; IPCC, 2021).

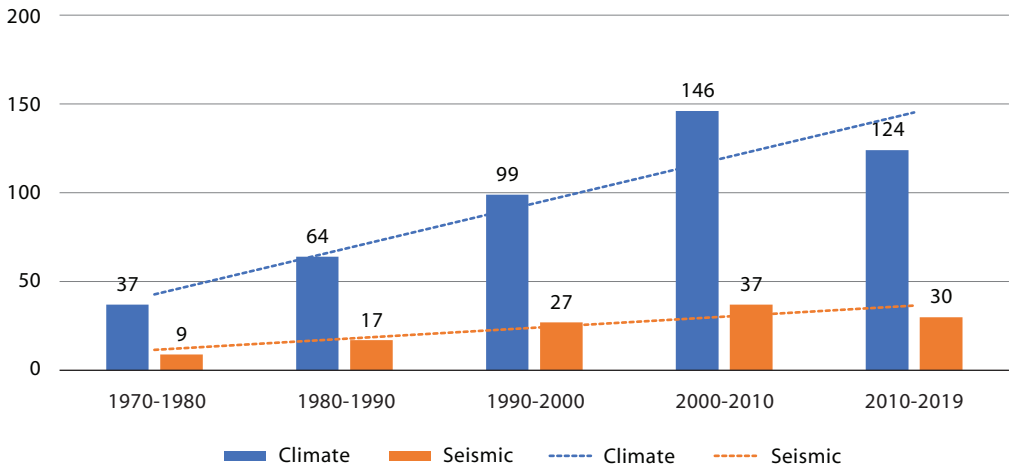
The *2019 Asia Pacific Disaster Report* further shows that climate change became the main driver of today's natural disasters – see figure 1.1 (ESCAP, 2019). Based on RCP 8.5[2] analysis by Mckinsey, by 2050, more than 85 per cent people living in areas with a non-zero annual probability of lethal heat waves will be in Asia; the gross domestic product (GDP) at risk due to labour productivity affected by extreme heat and humidity in Asia will account for more than two thirds of the total annual global GDP impact; and about $1.2 trillion capital stock in Asia is expected to be damaged by riverine flooding in a given year, equivalent to about 75 per cent of the global impact (Woetzel and others, 2020).

Climate change in the context of the SDGs and lagging progress in the Asia-Pacific region

As the essential part of the 2030 Agenda, the General Assembly adopted the Sustainable Development Goals (SDGs) in which it called for action by all countries in a global partnership (United Nations, 2015b). The Goals reflect the three key dimensions of sustainable development. Acknowledging the interrelated nature of these three dimensions, despite possible overlaps, the 17 SDGs can roughly be categorized into economic development (Goals 1, 7,

[2] RCP refers to Representative Concentration Pathway. Climate science makes extensive use of scenarios ranging from lower (RCP 2.6) to higher (RCP 8.5) CO_2 concentrations. RCP 8.5 enables assessment of the full inherent physical risk of climate change in the absence of further decarbonization.

Figure 1.1 **Disaster events in the Asia-Pacific region – average per decade**



Source: ESCAP (2019).

8, 9), social development (Goals 2, 3, 4, 5, 10, 16) and environmental development (Goals 12, 13, 14, 15).

Among the SDGs, **Goal 13 explicitly prescribes "take urgent action to combat climate change and its impacts".** The achievement of some other goals can also accelerate the mitigation and adaptation of climate change, for instance, increasing access to affordable and clean energy (Goal 7) will be critical for reducing GHG emissions. In turn, progress in achieving Goal 13 is crucial for some other goals as well. For example, combating climate change is fundamental for ensuring good health and well-being (Goal 3) and reducing the impact of natural disasters (under Goal 11).

"The Asia-Pacific region has regressed in its climate action, SDG 13."

According to the *Asia and the Pacific SDG Progress Report* 2021, on its current trajectory the Asia-Pacific region is unlikely to meet any of the 17 Goals by 2030 (ESCAP, 2021). Notably, the region has regressed in its climate action (Goal 13) (figure 1.2).

GHG Emissions in the Asia-Pacific region

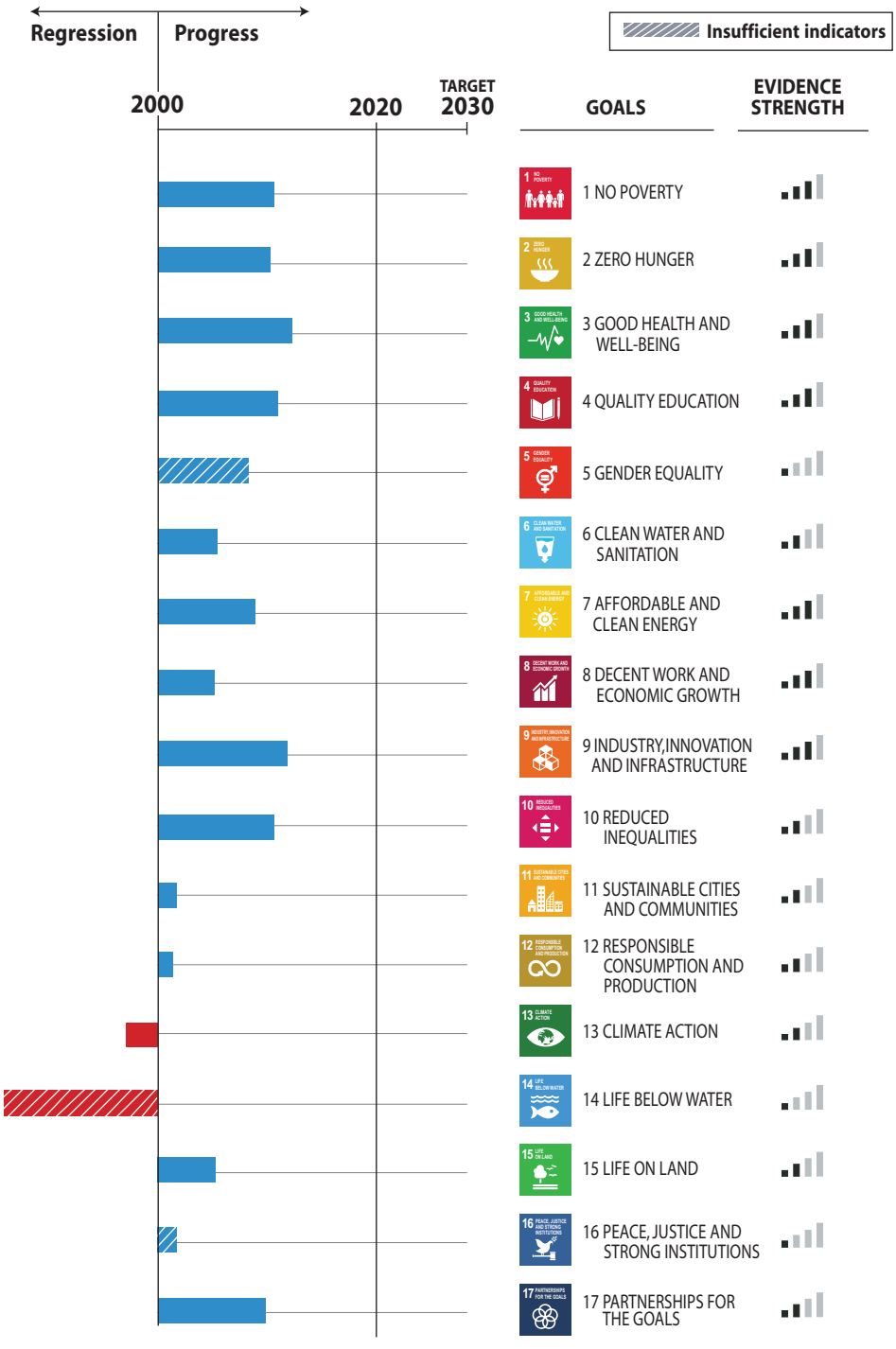
"The Asia-Pacific region accounts for more than half of GHG emissions."

In 2018,[3] Asia-Pacific economies accounted for 54 per cent of global GHG emissions (Climate Watch, 2020). The region is home to more than 60 per cent of the world's population, but accounts for only 38 per cent of the global GDP (World Bank, 2021). Four of the world's top five emitters are in the region (table 1.1). Yet, despite the high absolute values, the pollution per capita in the region is 5.77 tonnes of CO2 (tCO2) per capita, (as opposed to 7.4 tCO2 in the rest of the world). GHG emissions per $1 million of GDP, however, are almost double that of the rest of the world, suggesting less efficient production processes, but also reflecting that many of the region's economies are a source of energy intensive goods (as opposed to, for example, the United States, which has a significant merchandise goods deficit, but also a significant proportion of its GDP is service-based).

[3] The latest year for which detailed country and sector level emissions data were available for multiple greenhouse gases.

Figure 1.2

Snapshot of SDG progress in 2020 in the Asia-Pacific region



Source: ESCAP (2021).

Table 1.1

GHG emission profile of top global territorial emitters, 2018

Economy	Total GHG emissions (GTCO2)	Share of Global Total (per cent)	tCO2 per capita	CO2 per t$1 million of GDP
China	11 706	23.9	8.4	0.82
United States	5 794	11.8	17.7	0.27
India	3 347	6.8	2.4	1.17
Russian Federation	1 992	4.1	13.8	1.17
Indonesia	1 704	3.5	6.3	1.52
Brazil	1 421	2.9	6.7	0.77
Japan	1 155	2.4	9.1	0.23
Iran (Islamic Republic of)	828	1.7	10.0	1.82
Germany	777	1.6	9.3	0.20
Canada	763	1.6	20.3	0.44
Mexico	695	1.4	5.4	0.55
Congo (Democratic Republic of the)	682	1.4	7.9	13.52
Republic of Korea	673	1.4	13.0	0.41
Saudi Arabia	638	1.3	18.6	0.80
Australia	619	1.3	24.4	0.44
South Africa	521	1.1	8.9	1.48
Turkey	474	1.0	5.7	0.62
United Kingdom	441	0.9	6.6	0.16
Pakistan	438	0.9	2.0	1.58
Thailand	431	0.9	6.2	0.79
Rest of the Asia-Pacific region	2 881	5.9	4.1	1.10
Asia-Pacific region total	**26 248**	**53.6**	**5.8**	**0.80**
Rest of world (excluding above)	**10 960**	**22.4**	**5.4**	**0.42**
TOTAL	**48 940**	**100.0**	**6.4**	**0.57**

Source: Authors' calculations based on data from World Bank (2021); Climate Watch (2020) (accessed May 2021).

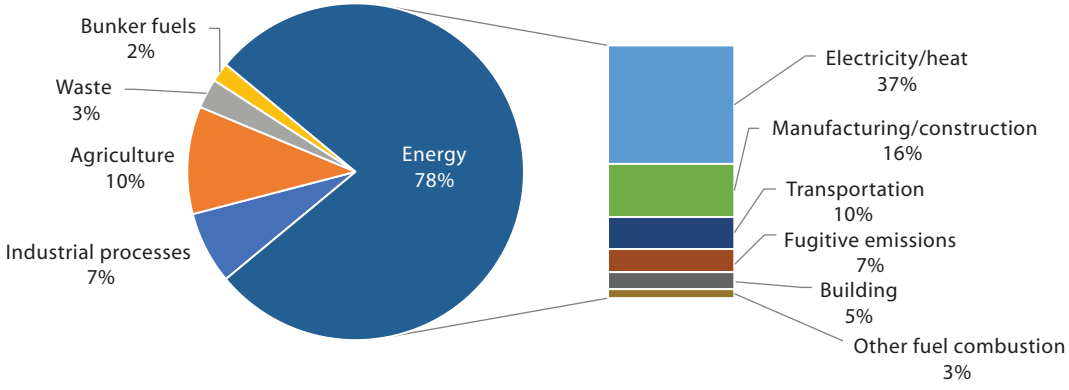
Note: Highlighted rows represent Asia-Pacific regional economies.

"The vast majority of emissions are from the energy sector. Share of emissions from manufacturing in the region are double of what is observed in the rest of the world."

Sector-wise, in the Asia-Pacific region, the vast majority of emissions are from the energy sector, of which electricity and heat generation account for the bulk of energy emissions (37 per cent of total emissions – see figure 1.3). This is higher than emissions from electricity and heat in the rest of the world (26 per cent of total emissions). The share of emissions from manufacturing in the region is double of what is observed in the rest of the world. Emissions from transportation, on the other hand, are 10 per cent of total emissions in the Asia-Pacific region – significantly lower than 26 per cent in the rest of the world.

Figure 1.3

Sources of GHG emissions in the Asia-Pacific region, by sector, 2018



Source: Authors' calculations based on data from Climate Watch (2020) (accessed May 2021).

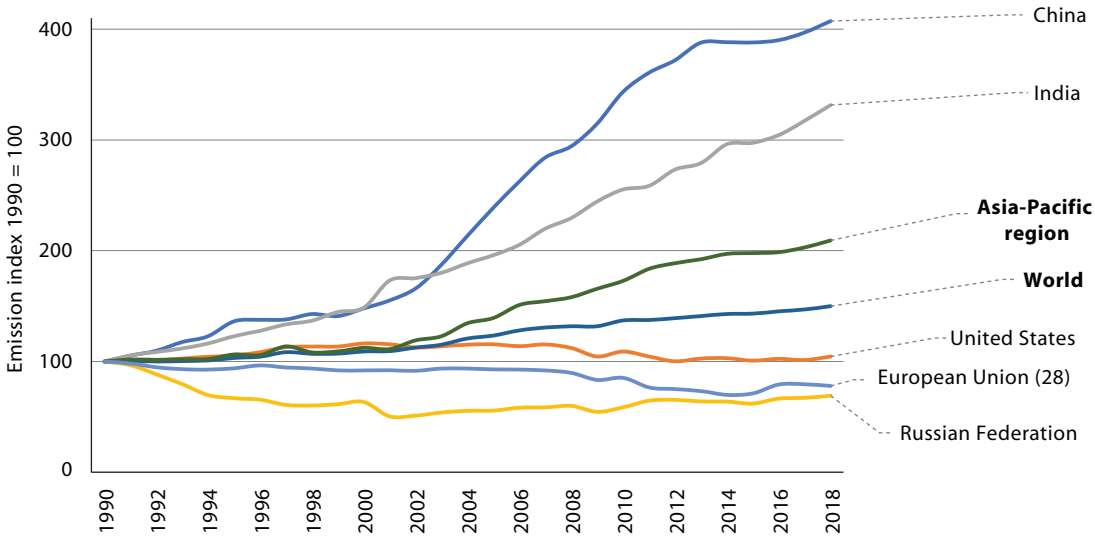
"Between 1990 and 2018, global GHG emissions increased by nearly 50 per cent, whereas in the Asia-Pacific region, they have more than doubled."

In terms of trends (figure 1.4), from 1990 to 2018, global emissions increased by nearly 50 per cent, whereas in the Asia-Pacific region, they have more than doubled. In China alone, they have quadrupled and in India, more than tripled, in the same period. During that period, the world population has increased by 45 per cent and the population of Asia by 40 per cent. This means that GHG emissions per capita have risen globally from 6.23 tCO2 to 6. 42 tCO2, whereas in the Asia-Pacific region, GHG emissions per capita have risen from 3.85 tCO2 to 5.78 tCO2.

Greenhouse gas emission accounting is typically done at the point of production (territorial emissions).

Figure 1.4

GHG emissions for largest emitters in the region, the World, and large trade partners over time, indexed, 1990 = 100



Source: Authors' calculations based on data Climate Watch (2020) (accessed May 2021).

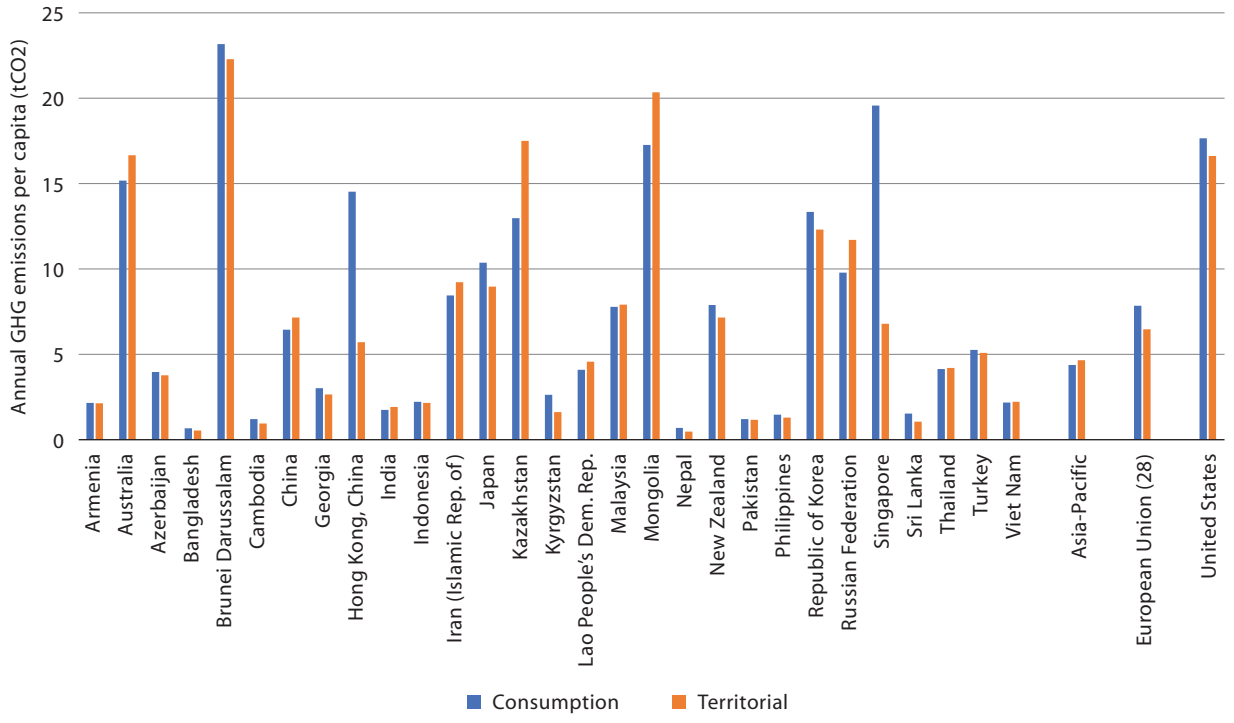
With international trade, consumption of final goods is jurisdictionally removed from the point of production. Since 1990, international trade, for the most part since, has increased at a faster rate than the global economy. To consider only the production/territorial emission could obscure some nuances important for effective climate-smart policymaking.

As discussed in detail in this report, divergence in climate regulations can cause "carbon leakage". This happens when production of emission intensive goods is shifted into jurisdictions with relatively low environmental standards, yet products find their way back into jurisdictions with high environmental standards through international trade. Figure 1.5 shows a comparison of per capita consumption and production emissions among economies in the Asia-Pacific region and the European Union and the United States. In aggregate, the region's territorial emissions are higher than its consumption emissions. Its major markets (European Union and the United States), on the other hand, have higher per-capita consumption emissions, meaning that products produced in the Asia-Pacific region and their emissions are due to the demand in these markets. High-income economies tend to have higher per capita consumption than production emissions, except in the cases of energy-exporting economies.

"The Asia-Pacific region's territorial emissions are higher than its consumption emissions."

Figure 1.5

Per capita territorial and consumption emissions in the Asia-Pacific region and large developed trade partners



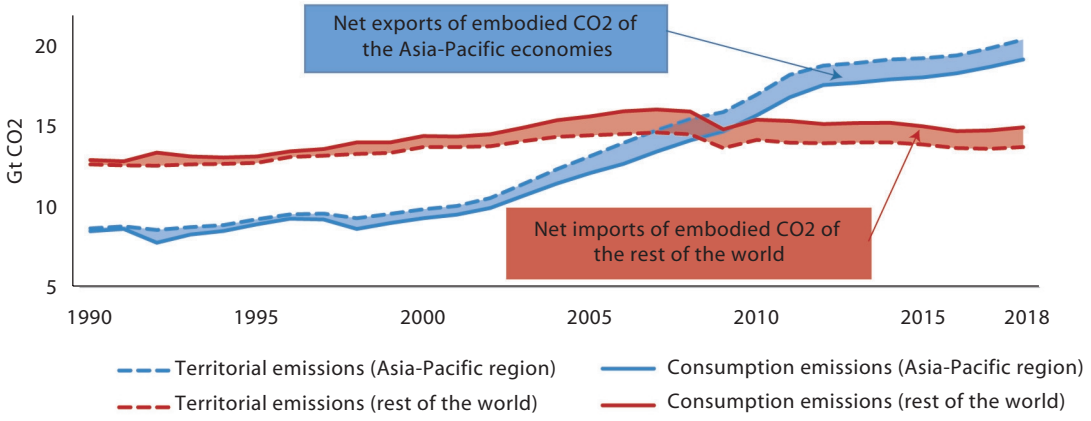
Source: Authors' calculations based on data from Friedlingstein and others (2020); World Bank (2021).

"The gap between consumption and production emissions in the Asia-Pacific region has widened, signifying increasing carbon leakage in the region."

While total emissions in the rest of the world have somewhat plateaued at around 13.5 GtCO2 per year (figure 1.6), it should be noted that the gap between consumption and production emissions has widened, signifying a significant leakage of carbon pollution from the rest of the world to the Asia-Pacific region.

The growth in emissions in the region has accelerated significantly since the late 1990s, overtaking the rest of the world after the Global Financial Crisis of 2008. While the consumption/territorial gap remains high, mirroring the rest of the world, it only accounts for a relatively small share of the overall increase in emissions. This means that the bulk of the GHG emissions growth has been from increased consumption due to increased economic development in the region, rather than from the leakages from manufacturing of products destined to the developed markets.

Figure 1.6 **Territorial and consumption emissions in the Asia-Pacific region and the rest of the world, 1990–2018**



Source: Authors' calculations based on data from (Friedlingstein and others (2020); World Bank (2021).

"Most emissions in the Asia-Pacific region are the result of increased domestic consumption rather than from production destined for markets outside of the region."

Nevertheless, these leakages are likely to gain further prominence as large climate action policy champions, such as the European Union, are implementing more stringent carbon pricing policies and other countries "ratchet up" their emission commitments. If unaddressed, carbon pricing policies could even increase emissions if relatively cleaner producers are priced out of the market and are substituted for cheaper but more polluting and less regulated producers overseas (Rocco and others, 2020). Carbon border adjustment taxes (discussed in chapter 6, aim to "plug in" such leakages, and address the concerns of loss of domestic competitiveness.

"Carbon pricing policies could even increase emissions through leakages to jurisdictions with lax environmental laws and less efficient production processes."

An important consideration to consider while reading this report is that countries often have divergent priorities when it comes to climate action. Developing countries emphasize that per capita GHG emissions remain far lower than those of developed countries (refer to table 1.1 and figure 1.5) and the developing countries' cumulative emissions since the beginning of the industrial revolution are even lower. Accordingly, there is an ongoing argument that

developing countries should be compensated by developed countries for the emissions reductions through financial and technological transfers and contributions. Some Asia-Pacific Governments hold the view that trade policy should not be used in the context of climate change policy. Indeed, the legality of carbon border adjustment taxes with respect to the WTO commitments are being questioned. The European Union to date has signaled that least developed economies will be exempt from such regulations.

"It is important to consider that countries in the region have divergent priorities when it comes to climate action."

As shown, emissions originating in the region – whether or not from manufacturing products destined for economies outside of the region – are unsustainable. As such, there are calls to ensure that trade and investment policy is examined with a climate-smart lens. It is particularly important in the light of COVID-19 anticipated recovery booms. For that, however, it is useful to define "climate-smart" trade and investment policies.

B. WHAT IS CLIMATE-SMART TRADE AND INVESTMENT?

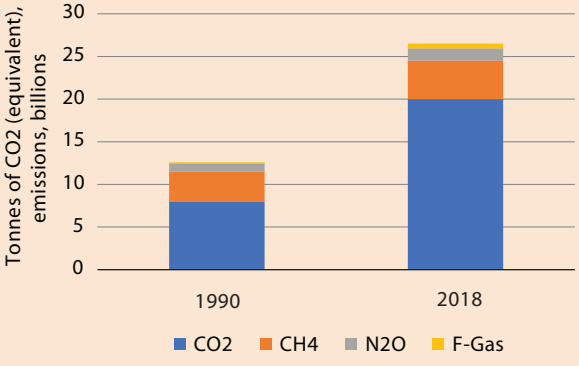
For the purposes of this report, it is first necessary to define "climate-smart". The motivation of climate-smart (versus green or sustainable) policies solely concerns climate change. In general, this essentially comes down to policies intended to limit and lower GHG emissions. Though the climate change narrative is often associated with CO2 alone, it is important to note that other GHGs play an important role as well – see box 1.1.

Box 1.1

Greenhouse gases other than CO2

The growth of GHG emissions from 1990 to 2018 has been mainly driven by CO2, primarily from fossil fuel burning (figure A). To address this, some of the main steps taken are the main focus has been moving towards renewable energy sources, taxing CO2 emitting economic activities (and removing fuel subsidies), promoting efficiency etc. At the same time, it is important to note that other potent greenhouse gases exist, and should be considered when developing solutions to address climate change. Indeed, IPCC notes that limiting warming to 1.5°C implies a rapid phase out of CO2 *emissions and* deep emissions reductions in other GHG (Rogelj and others, 2018).

Figure A. Composition of main GHG emissions, 1990 and 2018, Asia-Pacific region



Source: Authors' calculations based on data Climate Watch (2020) (accessed May 2021)

Notes: CO2, carbon dioxide; CH4, methane; N2O, nitrous oxide; F-Gas, fluorinated gases.

Carbon dioxide (CO2): Carbon dioxide enters the atmosphere through burning of fossil fuels and other material and as a result of certain processing, such as manufacture of cement. It is also sequestered by plants, meaning that land use change, such as deforestation, further contribute to CO2 emissions (EPA, 2021).

Methane (CH4): Methane is emitted during the production and transport of fossil fuels, from livestock and other agricultural practices, land use and by the decay of organic waste in municipal solid waste landfills (EPA, 2021).

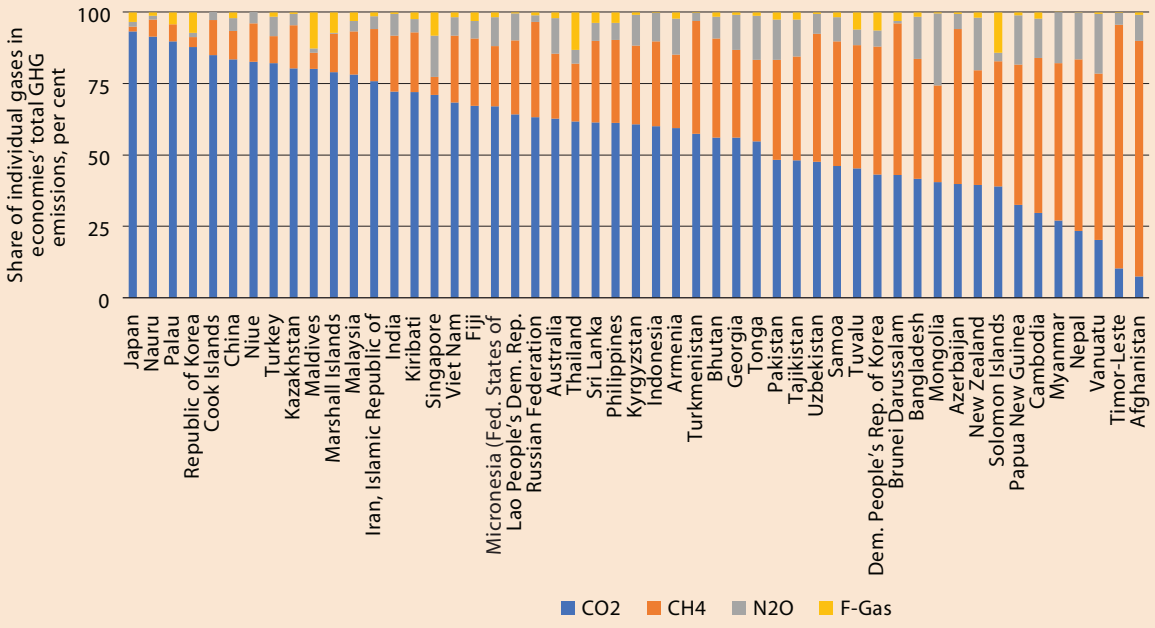
Box 1.1 *(continued)*

Nitrous oxide (N2O): Nitrous oxide is emitted during agricultural, land use, industrial activities, combustion of fossil fuels and solid waste and during treatment of wastewater (EPA, 2021).

Fluorinated gases: Fluorinated gases are derived from certain industrial processes sometimes used as substitutes for stratospheric ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as high global warming potential gases ("high GWP gases") (EPA, 2021).

In 2018, globally almost three quarters of CO2 equivalent emissions were from CO2. However, the global averages mask significant diversity among countries (see figure B). As such, for **12 economies in Asia and the Pacific emission in non-CO2 gases constitute more than half of their CO2 equivalent GHG emissions.**

Figure B. Composition of GHG emissions across countries



Source: Authors' calculations based on data Climate Watch, 2020 accessed May 2021.

Notes: CO2, carbon dioxide; CH4, methane; N2O, nitrous oxide; F-Gas, fluorinated gases

One such country is New Zealand. In 2019, 82.4 per cent of its electricity came from renewable sources, and CO2 emissions per capita were lowest among the developed countries. However, its total GHG emissions per capita were comparable to other developed countries due to the country's thriving livestock and dairy export industry. Its gross methane emissions were mainly (85.8 per cent) produced by livestock (Stats NZ, 2020). Gross nitrous oxide emissions mostly came from agricultural soils (92.5 per cent), mainly due to urine and dung deposited by grazing animals (Stats NZ, 2020).

To address these emissions, the Government of New Zealand initially attempted to install a "fart tax" as early as 2003. However, this came under extreme opposition from farmers, and it was eventually replaced by voluntary contributions. Nevertheless, in 2019, the Government succeeded in adding farm emissions to its climate change pledges. Taxing farmers for emissions was a key issue behind the country's largest ever protests, which occurred in July 2021.

"Internalizing environmental costs of GHG emissions to ensure functioning market signals is arguably the most urgent policy priority."

Internalizing environmental costs of GHG emissions to ensure functioning market signals is arguably the most urgent policy priority. A straightforward but elusive policy to help achieve that is phasing out fossil fuel subsidies, or substituting them with more effective policies, as discussed in chapter 2. A fossil fuel subsidy is a non-tariff measure (NTM) that distorts trade. It falls under the WTO Agreement on Subsidies and Countervailing Measures, the WTO Agreement on Agriculture if supporting the agricultural industry, and ongoing negotiations on fisheries subsidies (in places where fishing fuel is subsidized/exempt from various taxes). Another global priority is to ensure sufficiently high carbon prices without leakages and loss of domestic competitiveness through international trade and FDI to jurisdictions with less stringent environmental legislation.

"Climate-smart polices are not limited to replacing fossil fuels with renewable energy, they can also aim to reduce GHG emissions through various other means, including reducing waste, ensuring transportation efficiency and changing consumption or use patterns."

It is also important to note that climate-smart polices are not limited to replacing fossil fuels with renewable energy; they can also aim to reduce GHG emissions through various other means, including reducing waste, ensuring transportation efficiency and changing consumption or use patterns. For example, many economies in the region[4] have introduced climate-smart trade-related regulations that phase out imports of incandescent lightbulbs, replacing them with more efficient varieties. In contrast, as pointed out in the *Asia-Pacific Trade and Investment Report 2019*, less than 10 per cent of economies have NTMs addressing imports of illegal timber (ESCAP and UNCTAD, 2019). As such, this lack of technical regulations of imports contributes to deforestation and climate change. UNODC (2019) reports that South-East Asia, despite a continued crackdown on poachers, remains a hub for the illegal wildlife and timber trade. Agriculture subsidies can also affect climate change, as discussed in box 1.2.

The scope of trade and investment policies also requires clarification. Traditional trade policy instruments, such as ordinary tariffs, play a decreasingly important role. NTMs are now more prevalent. The universe of such measures is diverse, and encompasses such measures as technical barrier to trade, (such as emissions standards on imported vehicles), as well as finance measures (such as tax breaks), subsidies and more – see ESCAP and UNCTAD (2019) for details. Accordingly, in this report, trade and investment policies are considered in their wider sense to include domestic policies that can impact international trade and foreign investment, as well as traditional trade polices instruments, such as tariffs, provisions in trade agreements, and trade facilitation.

Climate-smart trade and investment is, therefore, trade and investment that specifically take into consideration the impact that international trade and investment activities have on climate change, rather than simply their economic and social impacts. Following this, climate-smart trade and investment policies encompass all government regulations aiming to reduce or limit net[5] GHG emissions, which can affect foreign trade and investment.[6]

"Climate-smart trade and investment policies encompass all government regulations aiming to reduce or limit net GHG emissions, which can affect foreign trade and investment."

The range and nature of such polices, as discussed in this report, is extremely diverse; they include tariffs

[4] China; Democratic People's Republic of Korea, India; Kazakhstan; Malaysia; Nepal; Republic of Korea, Russian Federation; Singapore, Tajikistan; and Uzbekistan.

[5] "Net" is also an important nuance as some policies can also contribute to carbon storage. Hypothetically, reducing trade barriers (both outwards and inwards) to nuts can potentially contribute to the removal of CO2 from the atmosphere as land use change from cropland to nut trees acts as a carbon sink, similarly, polices prohibiting trade in illicit timber.

[6] Note that the scope of this report is on mitigation rather than adaption. This means that policies are actively trying to lessen the impact of climate change rather than adapt to its consequences. Adaptation, is, of course, an important consideration in the context of trade and investment, for example, more frequent adverse weather events require investment in disaster risk reduction, but it is beyond the primary scope of this report.

Box 1.2

Agriculture subsidies, trade and climate change

Forests are a natural carbon sinks and are lauded as one of the solutions to climate change. However, deforestation, in part the result of land use change, is a serious global concern. Land use change is triggered by changes in agricultural (including forestry) output prices (Robalino and Herrera, 2010). As such, trade can contribute to deforestation if trade liberalization incentivizes land use change away from forestry, or vice versa. Agricultural subsides, however, alter the structure of such incentives and are often considered to be the "key underlying drivers of forest loss worldwide" (United Nations, 2015a). Evidence of this effect is plentiful. For example, reduction in agricultural subsidies in Brazil contributed to a 15 per cent decrease in deforestation in the Amazon between 2008 and 2011. Similarly, elimination of agricultural subsidies in New Zealand in 1980 led to eventual reforestation.

Agricultural subsidies fall under Article 6 of the WTO Agreement on Agriculture. Subsidies that are used to support prices, or subsidies directly related to production quantities are permitted to a limited extent – generally 5 per cent of the product value for developed countries, and 10 per cent for developing countries (WTO, 2019b). Article 6 of the Agreement also gives developing countries flexibilities to provide domestic support for the purposes of their development programme, designed to encourage agricultural and rural development. The reduction of agricultural export subsidies is a key staple of the WTO Agenda, and the SDGs under target 2b (trade distortion in agricultural markets), indicator 2.b.1 (agricultural export subsidies). It is worth noting that the total agricultural subsidies by WTO members decreased from $4.6 trillion in 1995 to $180 billion in 2014 (United Nations, 2018, as cited by Kravchenko, 2018).

It is likely that the impact of climate change will increasingly be considered in agricultural policy and subsidies. For example, recognizing the role agriculture plays in climate change (about 10 per cent of the European Union's total GHG emissions), European Union spending on subsidies from 2023 (around a third of its total budget) will be aligned with the target of net-zero emissions by 2050.

on fossil fuels (or removal of subsidies), removal of tariffs on environmental goods (or providing subsidies), and regulations government emissions requirements. Such policies also include removing undue wastage in trade procedures, such as through reducing transit waiting time at the border, and substituting printed documents to digital documents.

While the Paris Accord calls for multilateral collaboration and individual economies push ahead implementation of their individual commitments, bilateral and plurilateral collaboration addressing climate change are also on the rise. An increasing number of trade and economic partnership agreements explicitly address climate-related concerns. One illustration is the ongoing negotiations of the plurilateral Agreement on Climate Change, Trade and Sustainability (ACCTS) by Costa Rica, Fiji, Iceland, New Zealand, Norway and Switzerland. The Agreement specifically envisages removing barriers for trade in environmental goods, eliminating fossil fuel subsides and the development and implementation of eco-labelling on consumer products (such climate-smart non-tariff measures are discussed in chapter 2).

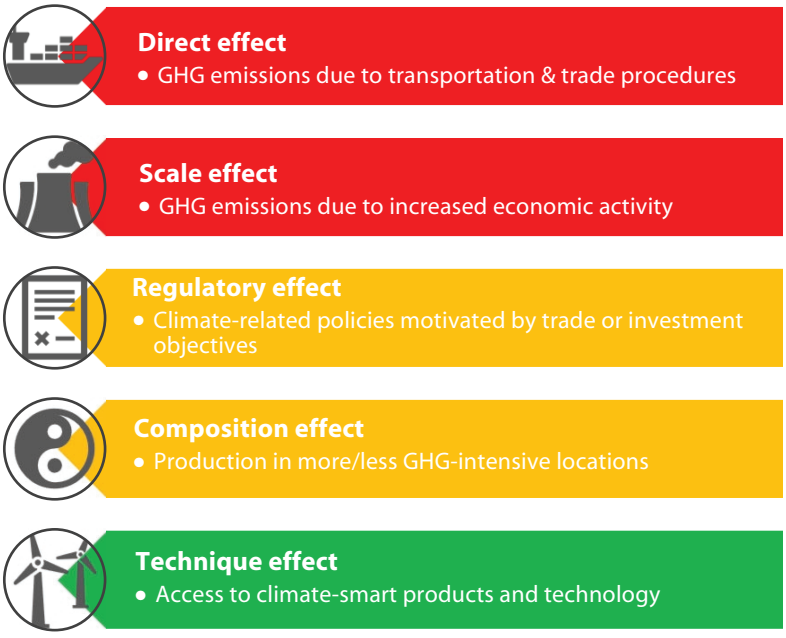
The following section provides theoretical underpinning to aid the discussion in the subsequent chapters on climate-smart trade and investment policies.

C. INTERPLAY BETWEEN TRADE, INVESTMENT AND CLIMATE CHANGE

1. The impacts of trade on climate change

Trade impacts climate change through five kinds of effects: direct effect, scale effect, composition effect, technique effect and regulatory effect (figure 1.7).

Figure 1.7 **Effects of trade an investment on GHG emissions**



Source: Authors' illustrations.

Direct effect are emissions from physical movement of goods – transportation (Monkelbaan, 2011). A knee-jerk reaction from many with environmental concerns is to focus on transportation emissions in international trade as the predominant link between trade and emissions. As the subsequent discussion in this chapter and beyond explains, it is but one part of the nexus of trade and climate. For some products, transportation is a negligible part of the GHG footprint. For other products, specialization in production of that product in one economy can lead to significant economies of scale that raise efficiency, or have specific green energy endowments that make energy-intensive production greener. Trade is also indispensable for the diffusion of green technologies.

"The relationship between trade and investment goes way beyond the effect of emissions from transport."

The scale effect refers to the positive correlation of the scale of trade with the scale of GHG emission. The expansion of trade leads to the expansion of economic activity. The greater scale of economic activity requires more energy consumption, such as fossil fuel burning, which generates more GHG emission.

The composition effect refers to the consequences of trade, derived from the comparative advantage theory. If a country has a comparative advantage in an emission-intensive sector, opening to trade will result in the expansion of this sector, and thus raise the GHG emission level, versa visa (UNEP and WTO, 2009). That is to say, the composition effect of trade on climate change is uncertain – it may increase GHG emission in one country while reduce GHG emission in another. The composition of production in an economy may also be changed by differences in environmental regulations between countries, as countries with lax regulations may become so-called "pollution havens". Some even argue that "pollution haven" (or "emission haven" in the context of climate change) is an inevitable consequence of robust environmental policies (UNEP and WTO, 2009).

The technique effect refers to the effect of technical – or technological – development. Improvements in methods of production can reduce the emission

intensity of output. This is the principal way in which trade opening can help mitigate climate change. There are two ways of reducing GHG emission intensity through the technique effect of trade opening. First, supply-side wise, opening trade can increase the availability and lower the cost of, climate-friendly goods and services (as a subset of "environmental goods and services"). Second, demand-wise, opening to trade leads to a rise in income levels, and the rise in income may make populations demand a cut in GHG emissions, similar to the demand for a cleaner environment. Consequently, to meet the public's demand, Governments need to adopt environmental policies that urge enterprises to lessen GHG emission by adopting greener production technologies.

"Trade is indispensable to the dispersion of products and technologies necessary to address climate change, yet barriers persist".

More recently, a fifth effect, dubbed "regulatory effect", is cited in the literature. This effect concerns the direct effect of trade on the adoption of certain policies. Examples of this are external pressure by trade partners – whether through trade agreements or their relative size as a trade partner (Reuveny, 2010). However, the positive outcome of this effect is not guaranteed: for example, the Government of Indonesia has reduced environmental and labor regulatory requirements to attract more foreign investment – whether they succeed is a different story (Olson, 2020).

"Trade and investment have a complex relationship to climate change, and the overall impact of trade on GHG emissions cannot be determined a priori."

The scale and technique effects tend to work in opposite directions, and the composition effect depends on the comparative advantage of countries and on differences in regulations between countries. As a result, the overall impact of trade on GHG emissions cannot be determined *a priori*. The net impact of GHG emissions depends on the magnitude or strength of each of the three effects, and ascertaining this requires detailed empirical analyses.

Taking other impacts of trade, such as technology transfer, into account makes an impact assessment of trade and investment on climate change even more complicated. Generally, however, reducing scale effects alone typically involves a tradeoff with the important goal of economic growth. A win-win growth strategy is a policy package that promotes technique effects while simultaneously supporting environmental goals and growth goals. As such, the purpose of climate-smart trade and investment policy is to minimize the impact of the scale effect, and to maximize the positive impact from composition and the technique effects. This means ensuring that production at source of goods and services is at least as energy efficient as at home (through an energy mix regulatory environment to minimizing instances of "emission havens"), taking full advantage of foreign climate-smart technologies abroad and making domestic climate-smart technologies available in foreign markets.

"A win-win growth strategy is a policy package that promotes technique effects while simultaneously supporting environmental goals and growth goals."

Recent econometric or statistical studies have reached a consistent conclusion that trade openness leads to economic growth while inducing CO2 emissions (Chandia, 2018; Tsurumi, 2010; Ahmed, 2016). The contribution of trade openness to CO2 emissions is greater at the early phase of industrialization, when the scale effect dominates composition and the technique effect due to weak infrastructure and technology (Tsurumi, 2010). However, an empirical study on four newly industrializing economies, Brazil, China, India and South Africa, has drawn a conclusion that in the long term, trade liberalization offsets its negative emission impact through lesser emission-intensive production (Ahmed, 2016). At the same time, studies suggest the significant role of climate-friendly measures in accelerating this process of offsets, particularly through international technology diffusion (Ahmed, 2016; Brewer, 2008).

International trade has not only the potential to contribute to climate change mitigation or adaptation, but it also can build the capacity to adapt to climate change and its associated impacts. Indeed, climate change is most likely to induce a shortage in supply of food and agricultural products in regions that are exposed to extreme weather events. International trade in food and agricultural products is an

important tool to adapt to these changes, enabling countries where climate change-induced shortages occur to import from countries where food and agricultural products continue to be available.

"International trade has not only the potential to contribute to climate change mitigation or adaptation, but also has the potential to build the capacity to adapt to climate change and its associated impacts."

2. Impacts of international investment on climate change

Investment in climate-friendly projects, such as renewable energy stations, contribute to the mitigation of climate change. Generally, the scale, composition and technique effect theory also apply to foreign direct investment (FDI), indicating they have a positive impact on climate change. The debate on the "pollution havens" hypothesis has also been ongoing. Empirical evidence exists that resource and pollution intensive industries have a locational preference for, and an influence in, creating, areas of low environmental standards, confirming the "pollution havens" hypothesis, though it is dependent on the level of developing of trade partners (Mabey and McNally, 1999). Most recent literature obtained consistent conclusions, but it highlights that energy efficiency and renewable energy has reduced the GHG emissions in all cases (Sarkodie, Adams and Leirvik, 2020; 2019; Liobikiene and Bùtkus, 2018). It is promising that in 2021, renewable energy replaced coal, oil and gas as the top sector by capital investment for the first time ever (fDi Intelligence, 2021).

"In 2021, renewable energy replaced coal, oil and gas as the top sector by capital investment for the first time ever."

3. International trade and carbon pricing

Carbon pricing initiatives, such as carbon taxes or emission trading schemes, aim to incentivize various sectors' reduction of GHG emissions, and are considered to be one of the main policy tools. Such initiatives generally increase the costs of production. However, in the context of international trade, if carbon prices are not harmonized, producers in jurisdictions with lower carbon price are at a clear advantage. For carbon-intensive products, increasing carbon prices can lead to reallocation of production to jurisdictions with laxer climate regulations, negating the intended policy objective of carbon pricing mechanisms (discussed and modelled in chapter 6).

"For carbon-intensive products, increasing carbon prices can lead to reallocation of production to jurisdictions with laxer climate regulations."

It is important to note that climate-smart trade and investment policies cannot and should not be considered or evaluated in isolation – see box 1.3. Indeed, more often than not, policies often impact more than one dimension of sustainability. As such, while this report primarily concerns climate-related policies, it should be stressed that all policy options should be evaluated across all dimensions. Furthermore, it is hoped that this report would build awareness of the importance of consideration of the climate dimension into policies in which climate is not intended as a primary policy objective.

"Climate-smart trade and investment policies cannot and should not be considered or evaluated in isolation."

D. CONCLUSION

The urgency to combat climate change is clear and indisputable. Trade and investment are main drivers of economic growth, but they are also significant contributors to energy consumption and GHG emissions. However, economic growth and environmental protection are not incompatible. Indeed, the integration of economic, environmental and social dimensions of development is the basis of the 2030 Agenda. Climate mitigation and adaptation measures do not have to be barriers to trade and investment, instead, further economic integration must be built on the agreement on and cooperation in environmental standards and policies, including climate change regulations.

In the context of COVID-19 recovery spending, careful attention must be ensured that policies do not become trade barriers, inviting retaliatory actions

Box 1.3

Why climate-smart policies cannot be considered in isolation

Over the years, many well-intentioned polices aimed at tackling various aspects of climate change (or related goals) had unintended consequences. The following is a few demonstrative examples showing that a careful sustainability impact assessment must be conducted *a priori*. However, even after conducting the most rigorous assessments, it is not always possible to predict unintended consequences, and as such, in addition to *a priori* and *post hoc* assessments, it is advisable to follow the principles of good regulatory practices. These include allowing sufficient flexibility to deal with an unpredictable environment, having sunset clauses in regulations and conducting regular reviews among other good practices (see ESCAP and UNCTAD, 2019, chapter IV, box 1).

While not originally aiming to address climate change, the United States started subsidizing ethanol production after passing the Energy Policy Act of 1978 as a way to decrease dependency on foreign oil imports. More recently, ethanol globally is viewed as a viable alternative to fossil fuel for internal combustion engines. While ethanol has a lower carbon footprint that gas, it generates other concerns. In terms of the environment, corn-based ethanol production has had a substantial impact on land use change and freshwater demand in parts of the United States. It also had social impacts in neighbouring Mexico: corn is a staple food, yet high subsidies in the United States inadvertently increased consumer prices in Mexico, threatening food security and affecting the poorest households the most. For example, tortilla prices increase by 69 per cent. Furthermore, the subsidies also contributed to higher meat and dairy prices, which increased by 35 per cent, as corn was used as feed (Wise, 2012).

In the case of the European Union biodiesel subsidies, the impact has been a significant land use change in South-East Asia where landowners were incentivized to chop down rainforests to produce palm oil. Not only was there a concern to deforestation – offsetting its primary goal of global GHG emission, deforestation also destroyed significant areas of wildlife habitat, including the habitat of critically endangered orangutangs. Aiming to address this, the European Union passed legislation stating that biofuel produced from palm oil is not considered “green fuel”, therefore not eligible for subsidies. This action, however, invited complaints to WTO from Indonesia and Malaysia, which account for 84 per cent of global palm oil production (Guild, 2021).

Another recent policy development aiming to address climate change is attempting to substitute cars with internal combustion engines to those running on batteries. However, production of batteries carries its own environmental and social issues. In China, lithium mining operations have contaminated water supplies (Katwala, 2018). Another vital component, cobalt, is predominantly found in the Democratic Republic of the Congo. The mining situation, however, is largely unregulated and unsafe, with frequent accidents and reports of child labor (Sanderson, 2021). There is also a question of e-waste from green technologies, such as batteries, wind turbines, solar panels. Legislation must be put in place to ensure that manufactures consider the full lifecycle of their products or face alternative environmental disasters.

Given the range of stakeholders affected by climate-smart trade policies in the short run, careful implementation remains essential even if net welfare gains are clear. For example, this report argues strongly for the abolishment of fossil fuels subsidies. However, such policies need to be carefully implemented, otherwise backlash is possible. Recent civil unrest in Latin America was in part triggered by the phasing out of some fossil fuel subsidies as noted in chapter 2, Indonesia was more successful in this action, aided by a public information campaign in which it was pointed out that saved money was to be directed to health care and education.

from trade partners. The United Kingdom Trade Remedies Authority has predicted that the country would be forced to institute a number of trade remedies "to counter 'a significant amount' of financial aid doled out during the pandemic and to underpin the shift away from fossil fuels" (Rees, 2021). Careful design can ensure double dividends, whereby governments' stimulus packages help jump start economies in the short term, and also contribute to long-term objectives of addressing climate change and circular economy (WTO, OECD and UNCTAD, 2020). It is then perhaps worthwhile to revisit some multilateral trade rules (on subsidies, government procurement/local content requirement and investment) to allow policy space for positive climate-action (Birkbeck, 2021).

Furthermore, as pointed out, different countries have different developmental priorities. This is reflected in the slow progress regarding carbon pricing, which has prompted the European Union to consider border carbon adjustment taxes. This, however, may invite retaliatory actions by opposing countries. Such moves can also be subsequently challenged at WTO and/or invite other retaliatory trade actions.

> *"Even though the overall impact of trade and investment on net GHG emissions and climate change is complex and difficult to quantify, clear pathways are emerging to make trade and investment climate smart"*

One cannot *a priori* say whether trade and investment increases or decreases GHG emissions. As such, the goal should be to increase the use of trade and investment-related policies that contribute positively to climate mitigation and reduce the use of those that do the opposite. Even though the overall impact of trade and investment on net-GHG emissions and climate change is complex and difficult to quantify, clear pathways are emerging to make trade and investment climate-smart. For instance, promoting trade in environment friendly goods and services; digitalizing trade and transport procedures; and increasing investment in the renewable energy industry are certainly good measures that contribute to reducing GHG emissions, while also preserving the role of trade and investment as key engines of development.

The rest of the report delves deeper in some of the issues and policies touched upon in this first chapter. Chapter 2 presents a state of play of the Asia-Pacific region in fostering climate-smart trade and investment. Chapter 3 includes a discussion on the important role of business, finance, and investments in driving climate action. Chapter 4 contains a review of the role of regional trade agreements (RTAs) in incorporating climate concerns in trade rules. Chapter 5 covers the importance of trade and transport facilitation in reducing the impact of trade on GHG emissions. Chapter 6 presents the impact of different policy scenarios, in particular implementation of carbon pricing schemes and border carbon adjustment mechanisms, on emissions, GDP, exports, imports, and investment in the Asia-Pacific region. Chapter 7 provides a summary of emerging recommendations for policymakers at national and regional levels.

REFERENCES

Ahmed, Khalid, Muhammad Shabaz and Phouphet Kyophilavong (2016). Revisiting the emissions-energy-trade nexus: evidence from the newly industrializing countries. *Environmental Science and Pollution Research,* vol. 23, pp. 7676–7691.

Beyer, Robert, Andrea Manica, and Camilo Mora (2021). Shifts in global bat diversity suggest a possible role of climate change in the emergence of SARS-CoV-1 and SARS-CoV-2. *Science of The Total Environment,* vol. 767.

Birkbeck, Carolyn (2021). Greening international trade: pathways forward. Geneva: Global Governance Centre and the Forum on Trade, Environment and the SDGs (TESS).

Brewer, Thomas (2008). Climate change technology transfer: a new paradigm and policy agenda. *Climate Policy*, vol. 8, No. 5, pp. 516–526.

Chandia, Khurram, and others (2018). An analysis of the association among carbon dioxide emissions, energy consumption and economic performance: an econometric model. *Carbon Management,* vol. 9, No. 3, pp. 227–241.

Climate Watch (2020). CAIT Climate Data Explorer. Washington, D.C.: World Resources Institute. Available at https://www.climatewatchdata.org.

fDi Intelligence (2021). The FDI report 2021: global greenfield investment trends. Available at https://fdi-report-2021.fdiintelligence.com/.

Friedlingstein, Pierre, and others (2020). Global Carbon Budget 2020. *Earth System Science Data,*vol. 12, no. 4, pp. 3269–3340.

Guild, James (2021). WTO to Review Malaysia-EU Palm Oil Spat. What Happens Next? *The Diplomat*, 8 June. Available at https://thediplomat.com/2021/06/wto-to-review-malaysia-eu-palm-oil-spat-what-happens-next/.

International Energy Agency (IEA) (2021). Global Energy Review: CO2 emissions in 2020. Available at https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020.

Intergovermental Panel on Climate Change (IPCC) (2014a). AR5 *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. New York: Cambridge University Press.

_____ (2014b). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. Geneva, Switzerland.

_____ (2018). Annex I, glossary In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context *of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.* Retrieved from https://www.ipcc.ch/sr15/chapter/glossary/.

_____ (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press.

Katwala, Amit (2018). The spiralling environmental cost of our lithium battery addiction. Wired, 5 August. Available at https://www.wired.co.uk/article/lithium-batteries-environment-impact

Kravchenko, Alexey (2018). Where and how to dodge taxes and shift money abroad using trade misinvoicing: a beginner's guide. ESCAP Trade, Investment and Innovation Working Paper Series, No. 1, April. Bangkok: ESCAP. Available at www.unescap.org/publications/where-and-how-dodge-taxes-and-shift-money-abroadusing-trade-misinvoicing-beginner-s-guide.

Liobikienė, Genovaité, and Mindaugas Butkus (2018). The challenges and opportunities of climate change policy under different stages of economic development. *Science of the Total Environment*, November, pp. 999-1007.

Mabey, Nick, and Richard McNally (1999). Foreign Direct Investment and the Environment: from Pollution Havens to Sustainable Development. A WWF-UK report. Available at https://www.oecd.org/investment/mne/2089912.pdf.

Monkelbaan, Joachim (2011). Interactions between trade and climate governance: Exploring the potential of climate clubs. *Global Trade and Customs Journal,* vol.16, No. 7/8, pp. 325–342. (2021). Bursa Malaysia: Moving the dial on ESG adoption. 22 February. Available at https://www.msn.com/en-my/money/topstories/bursa-malaysia-moving-the-dial-on-esg-adoption/ar-BB1dT7Tx.

Olson, Stephen (2020). Indonesia's "Omnibus Bill" weakens labor and environmental standards. Hinrich Foundation, 13 October. Available at https://www.hinrichfoundation.com/research/article/sustainable/indonesia-sustainable-trade/.

Rees, Tom (2021). Covid and climate spending set to trigger surge in trade disputes. *Telegraph*, 27 June. Available at https://news.yahoo.com/covid-climate-spending-set-trigger-164735148.html.

Reuveny, Rafael (2010). On Free Trade, Climate Change, and the WTO. *Journal of Globalization Studies,* vol. 1, No. 1, pp. 90–103.

Robalino, Juan, and Luis Herrera (2010). Trade and deforestation: What have we found? WTO. Available https://www.wto.org/english/res_e/publications_e/wtr10_robalino_herrera_e.htm.

Rocco, Matteo, and others (2020). Fighting carbon leakage through consumption-based carbon emissions policies: empirical analysis based on the World Trade Model with Bilateral Trades. *Applied Energy,* vol. 274.

Rogelj, Joeri, and others (2018). Mitigation pathways compatible with 1.5°c in the context of sustainable development. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Available at from https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf.

Sanderson, Harry (2019). Congo, child labour and your electric car. Financial Times, 7 July. Available at https://www.ft.com/content/c6909812-9ce4-11e9-9c06-a4640c9feebb.

Sarkodie, Samuel, Samuel Adams, and Thomas Leirvik, T. (2020). Foreign direct investment and renewable energy in climate change mitigation: Does governance matter? *Journal of Cleaner Production,* vol. 263.

Stats NZ (2020). New Zealand's greenhouse gas emissions. 14 October. Available at https://www.stats.govt.nz/indicators/new-zealands-greenhouse-gas-emissions.

Tsurumi, Tetsuya, and Shansuki, Managi (2010). Decomposition of the environmental Kuznets curve: scale, technique, and composition effects. *Environmental Economics and Policy Studies,* vol. 11, pp. 19–36.

United Nations (2015a). Government subsidies for agriculture may exacerbate deforestation, says new UN report. 3 September. Available at https://www.un.org/sustainabledevelopment/blog/2015/09/government-subsidies-for-agriculture-may-exacerbate-deforestation-says-new-un-report.

_____ (2015b). *Transforming our world : the 2030 Agenda for Sustainable Development.* New York: United Nations.

United Nations Economic and Social Commission for Asia and the Pacific (2017). *Asia-Pacific Trade and Investment Report 2017: Channelling Trade and Investment into Sustainable Development.* United Nations publication, Sales no. E.II._22.

_____ (2019). *The Disaster Riskscape Across Asia-Pacific – Pathways for Resilience, Inclusion and Empowerment. Asia-Pacific Disaster Report 2019.* United Nations publication, Sales no. E.19.II.F12.

_____ (2020). *Asia and the Pacific SDG Progress Report 2020*. United Nations publication,. Sales no. E.20.II.F1.

_____ (2021). *Asia and the Pacific SDG Progress Report* 2021. United Nations publication, Sales no. E.21.II. F.4.

_____, and United Nations Conference on Trade and Development (UNCTAD) (2019) *Asia-Pacific Trade and Investment Report 2019: Navigating Non-tariff Measures towards Sustainable Development*. United Nations publication, Sales no. E.19.II.F.14.

United Nations Environment Programme (UNEP) and World Trade Organiztions (WTO) (2009). *Trade and Climate Change: A Report By the United Nations Environment Programme and the World Trade Organization.* Geneva: WTO Publishing.

United Nations Office on Drugs and Crime (UNODC) (2019). Transorganized crime in Southeast Asia: evolution, growth and impact. Availalbe at https://www.unodc.org/documents/southeastasiaandpacific/Publications/2019/SEA_TOCTA_2019_web.pdf.

United States, Environmental Protection Agency (EPA) (2021). Overview of greenhouse gases. 27 May. Available at https://www.epa.gov/ghgemissions/overview-greenhouse-gases.

Wise, Timothy (2012). The Cost to Mexico of U.S. *Corn Ethanol Expansion*. GDAE Working Paper, Available at https://ageconsearch.umn.edu/record/179098/?ln=en.

World Meteorlogical Organization (WMO) (2021). *State of the Global Climate 2020 (WMO-No. 1264).* Geneva: WMO.

Woetzel, Jonathan, and others (2020). *Climate risk and response in Asia.* McKinsey Global Institute, 24 November. Available at https://www.mckinsey.com/business-functions/sustainability/our-insights/climate-risk-and-response-in-asia.

World Bank (2021). World Development Indicators.

World Trade Organization (WTO) (2014a). DS412: Canada – Certain measures affecting the renewable energy generation sector. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm.

_____ (2014b). *DS426:* Canada – measures relating to the feed-in tariff program. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm.

_____ (2015). Environmental Goods Agreement (EGA). Retrieved from https://www.wto.org/english/tratop_e/envir_e/ega_e.htm.

_____ (2017). China – Subsidies to *Producers of Primary Aluminium*. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds519_e.htm.

_____ (2018). DS456: India – Certain measures relating to solar cells and solar modules. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm.

_____ (2019). DS510: United States — Certain measures relating to the renewable energy sector. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds510_e.htm.

_____ (2021). WTO Dispute Settlement: One-Page Case Summaries 1995–2020. Available at https://www.wto.org/english/res_e/booksp_e/dispu_settl_1995_2020_e.pdf.

_____ (n.d.). Activities of the WTO and the challenge of climate change. Available at https://www.wto.org/english/tratop_e/envir_e/climate_challenge_e.htm.

_____, Organisation for Economic Co-operation and Development (OECD), and United Nations Confernce on Trade and Development (UNCTAD). (2020). Reports on G20 trade and Investment measures: mid-October 2019 to mid-May 2020. Available at https://www.oecd.org/daf/inv/investment-policy/23rd-Report-on-G20-Trade-and-Investment-Measures.pdf.

CHAPTER

State of play: How climate smart is trade and investment in Asia and the Pacific?

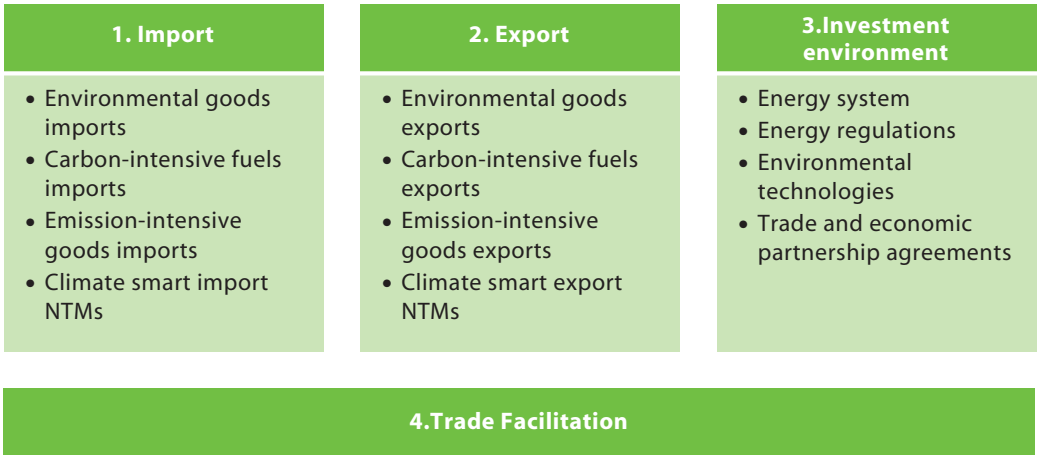
The objective of this chapter is to examine the extent to which trade and investment and associated policies in the Asia-Pacific region help address the challenges associated with climate change. To systematize the analysis and discussion, a climate-smart trade and investment index was constructed, supplemented with examples of emerging practices from the region and beyond.

A. CLIMATE-SMART TRADE AND INVESTMENT INDEX: AN OVERVIEW

The key to the discussion is extending the notion of climate-smart trade and investment from simply "reducing the negative impact" towards one in which actions are climate neutral, or positively address climate change, and create positive socioeconomic impacts and new business opportunities. The Climate-smart Trade and Investment Index (SMARTII), developed specifically to structure this discussion, captures the extent of the participation of Asia Pacific economies in different trade and investment-related activities that contribute towards climate change exacerbation or

Figure 2.1

Climate-smart Trade and Investment Index



Source: Authors' illustration.

Note: NTM, non-tariff measure.

mitigation, and support or hinder climate action. It focuses on the impact on greenhouse gas (GHG) emissions, and environmental and climate-related technologies development, diffusion and deployment (see figure 2.1).

1. Structure and methodology

Based on this objective, SMARTII aims to measure the performance of Asia-Pacific economies based on four dimensions: import; export; investment environment; and trade facilitation (figure 2.1). Each of those components are further divided into narrower areas for assessment.

"The Climate-smart Trade and Investment Index (SMARTII) aims to measure the performance of Asia-Pacific economies based on four dimensions: import; export; investment environment; and trade facilitation."

The **import and export** dimensions capture performance of the economies in terms of their trade in environmental goods, carbon-intensive fuels and emission-intensive goods, and also in their use of NTMs to address climate-related issues. The **investment environment** dimension is approximated using four subindices, namely state of an economy's energy system, climate-smart energy regulation, climate-smart technology investment, and climate-smart trade and economic partnership agreements. Implementation of **trade facilitation** measures can help reduce an economy's contribution to climate change in a few ways, which are further analysed in chapter 4 of this report. In short, implementation of trade facilitation measures minimizes resources used to administer trade transactions, such as energy and paper.[1]

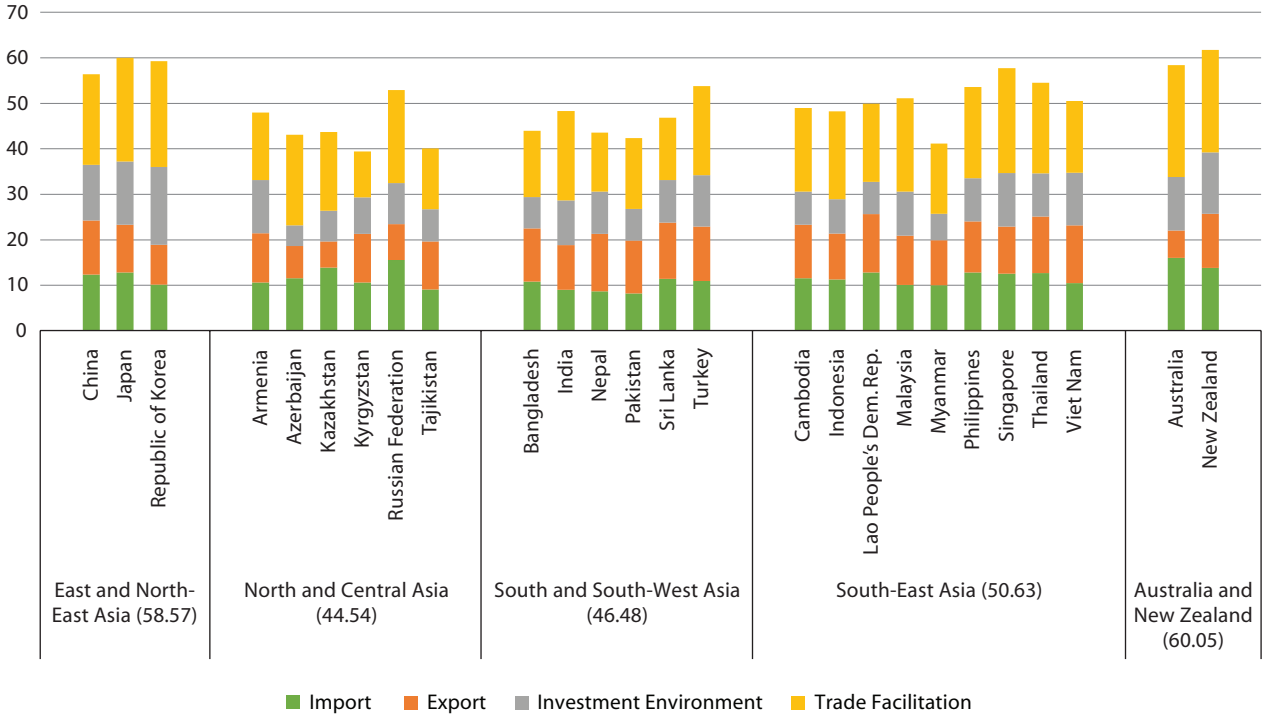
SMARTII and the underlying subindices are constructed to provide scores to Asia-Pacific economies between 0 and 100. The index rates the performance of the economies relative to each other and over time, namely the top and the bottom scores are determined by maximum and minimum values of the underlying indicators for the appraised Asia-Pacific economies and over the examined period of 2015–2019. Currently, SMARTII ranks 26 Asia-Pacific economies for which sufficient data for the underlying indicators are available. Overall results for the Asia-Pacific region are presented in figure 2.2. A further breakdown through an interactive dashboard is available at https://public.tableau.com/app/profile/maria.semenova/viz/Climate-smartTradeandInvestmentIndex/SMARTII_DB.

[1] The detailed structure of SMARTII and its indicators for each component is provided in the accompanying technical working paper.

2. High-level results

A higher value of the index implies that trade, investment and policies contribute less towards the exacerbation of climate change and more towards its mitigation and adaptation to the impacts. Figure 2.2 presents the scores for the Asia-Pacific region and its subregions, and economy rankings on the overall SMARTII in 2019. All the economies fall within the scores of 39 and 62. This is because although some Asia-Pacific economies are top performers in certain underlying indicators (obtaining a score of 100), none of them perform well in all of the underlying indicators.

Figure 2.2 **SMARTII scores for economies in the Asia-Pacific region in 2019**



Source: Authors' calculation.

The economies with the highest SMARTII scores in the region are New Zealand, Japan, the Republic of Korea, Australia and China. Five economies in South-East Asia also attained scores above the regional average: Singapore, Thailand, the Philippines, Viet Nam and Malaysia. Apart from the Russian Federation and Turkey, the rest of the countries in South and South-West Asia and North and Central Asia, for which data are available, attained scores below the Asia-Pacific average.

"The economies with the highest SMARTII scores in the Asia-Pacific region are New Zealand, Japan, the Republic of Korea, Australia and China."

In terms of trends, the Asia-Pacific region and its subregions attained higher SMARTII scores in 2019, as compared to 2015, and the year-on-year rate of change over the five-year period was positive for all the subregions, except for North and Central Asia, which scored somewhat lower in 2018 than in the previous year. The following sections include an analysis of the underlying trade and investment-related dimensions and indicators of the index and provide examples of emerging practices from the region and beyond.

"The Asia-Pacific region and its subregions attained higher SMARTII scores in 2019, as compared to 2015."

B. CLIMATE-SMART IMPORTS AND EXPORTS

1. Trade in environmental goods

Liberalizing and facilitating trade in environmental goods and services is a key aspect of how trade policies can help address climate change. Data on trade in services, however, are not as readily available at a granular level, unlike for trade in merchandise goods, and is, therefore, omitted from the index – a brief discussion on trade in environmental services is presented in box 2.1.

While it is implicitly understood that "environmental goods" in the context of climate change are goods (and perhaps their precursors) that positively contribute towards climate change mitigation and adaptation, there is no commonly agreed list of such products. In the ongoing negotiations of the Agreement on Climate Change, Trade and Sustainability (ACCTS), more than 80 products have

Box 2.1

Trade in environmental services

Services account for approximately 20 per cent of international trade[2] in the Asia-Pacific region. They are commonly classified in aggregate sectors, such as financial services, tourism, education, etc. One of the categories of services is "sewage and refuse disposal, sanitation and other environmental protection services", which includes services that are directly and indirectly related to climate change mitigation, such as sewage services, refuse disposal services, sanitation and similar services, cleaning of exhaust gases, and nature and landscape protection services (IPCC, 2014a; UN Statistics Division, n.d.).

Liberalizing trade in these subcategories can directly contribute to climate change action (IPCC, 2014a). Cleaning of exhaust gases includes emission monitoring and services aiming to control and reduce the level of pollutants in the air, predominantly from burning of fossil fuels. Nature and landscape protection services encompasses protecting ecological systems to reduce emissions from deforestation and other land use change, as well as research on environment and climate. Sewage services and refuse disposal services include methods and technologies of waste and waste water management that reduce or capture emissions of CO2, methane and nitrous oxide (IPCC, 2014a).

International trade in services is governed by the GATS, which was enacted in 1995. Under this treaty, member States outline the restrictions (if any) to engagement in trade in services in specific sectors. Members are free to tailor the sector coverage and substantive content of market access and national treatment commitments as they see fit. In terms of liberalization commitments, less attention is given to the environmental services sector, including the "others" subcategories in comparison to other services sectors, such as tourism and financial services (WTO, n.d.). However, recent climate focus and regulations has expanded action in this "others" subcategories of environmental services, and could be further liberalized (in terms of market access and national treatment) either through unilateral commitments or bilateral actions through trade agreement provisions (WTO, n.d.).

Furthermore, in a case study analysis, Steenblik and Grosso (2011) noted that liberalization in other services categories, such as business services, telecommunications services and construction and related engineering services, could potentially supplement climate action. The authors also noted that commercial presence (mode 3) is required for construction and the operation of production facilities, such as for renewable energy generation. Movement of natural persons (mode 4) is required to give international experts and/or supervisors access to the economy for a short duration. In general, the authors indicated that GHG-mitigation technologies frequently require specialized services, which are often imported. As such, addressing barriers can be done as part of general liberalization under GATS or through bilateral or plurilateral arrangements. The barriers to such critical foreign services requirements to aid climate action first need to be identified in collaboration with relevant stakeholders (including foreign stakeholders).

[2] (Exports + Imports of commercial services)/(Exports + Imports of commercial services and merchandise), authors' calculations based on data from the ESCAP statistics portal (https://www.unescap.org/stat/data) (accessed 4 August 2021).

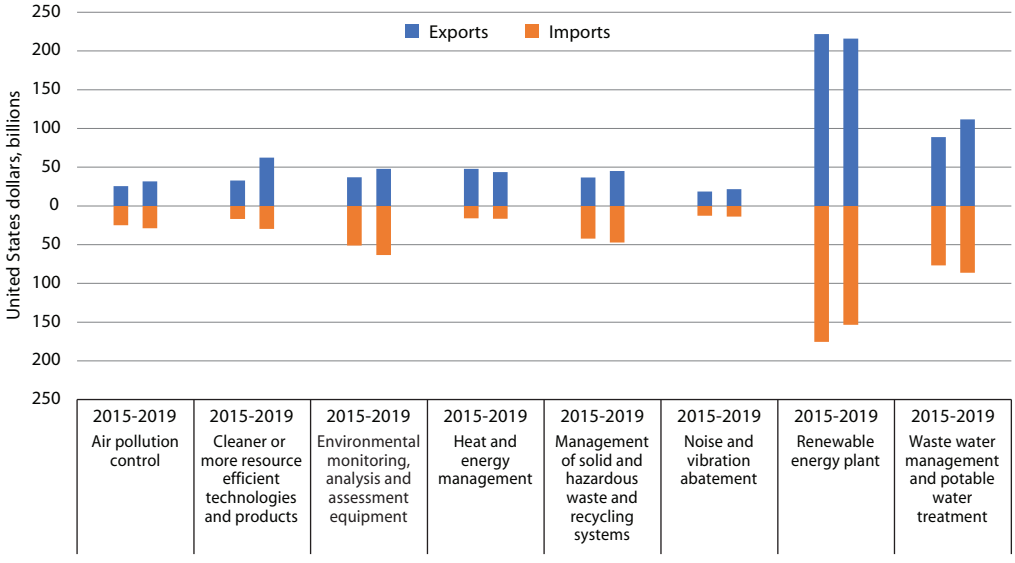
been added to the list of environmental goods, with potentially more to be included (New Zealand, 2020). This list is partly drawn from the APEC list of environmental goods, which consists of 54 products, and is used for the Environmental Goods Agreement negotiations (APEC, 2021). The APEC list, however, has important omissions, and a wider common list categorizing products as environmental goods is Organisation for Economic Co-operation and Development Combined List of Environmental Goods (CLEG) (Sauvage, 2014; Steenblick, 2005), which is used in this study.

The CLEG list includes goods that are classified in the following groups: air pollution control; cleaner of more resource efficient technologies and products; environmentally preferable products based on end-use or disposal characteristics, heat and energy management, environmental monitoring equipment, natural resources protection, and noise and vibration abatement; renewable energy plant, clean up and remediation of soil and water, wastewater management and waste management. While not all of these groups are directly addressing climate change, some goods that are relevant to other areas of environment protection are also relevant to the mitigation of climate change. For example proper waste management, wastewater treatment, reduction of water pollution and natural resources protection (forests) can reduce or stop emissions of GHGs and contribute towards the capture of CO2 in the atmosphere (IPCC, 2014a).

"Between 2015 and 2019, the absolute (nominal) export value of environmental goods in the Asia-Pacific region increased, but the share in total exports declined."

Between 2015 and 2019, the absolute (nominal) export value of environmental goods in the Asia-Pacific region increased from $515 billion to $585 billion, but the share in total exports declined from 9.2 per cent to 8.9 per cent. Similarly, imports increased from $419 billion to $443 billion, while the share decreased from 8.4 per cent to 7.5 per cent. Regarding renewable energy plants, the largest product category, exports and imports declined, while for wastewater management and potable water treatment, exports and imports increased (figure 2.3).

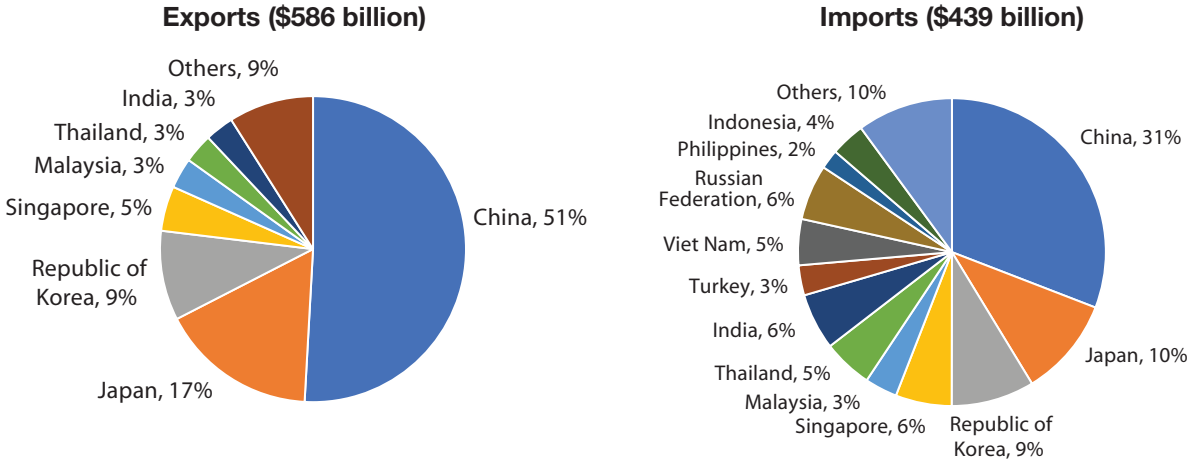
Figure 2.3 **Exports and imports of environmental goods by Asia-Pacific economies[3]**



Source: Authors' calculations based on data from UN Comtrade database (https://comtrade.un.org/).

[3] Categories "clean up or remediation of soil and water"; "environmentally preferable products based on end use and disposal characteristics", and "natural resources protection" are omitted, as their combined contributions are less than 0.1 per cent of total trade.

Figure 2.4 **Environmental goods exports and imports in Asia and the Pacific, 2019, by economy**



Source: Authors' calculations based on data from UN Comtrade (https://comtrade.un.org/).

In terms of individual economies, China exported more than half of the regional environmental goods in 2019 and imported about a third of total environmental goods by value (figure 2.4). Other large exporters are Japan, the Republic of Korea, Singapore, and Malaysia. Import-wise, the proportions were relatively more evenly spread, with 12 economies accounting for 90 per cent of imports of environmental goods in 2019 (as opposed to only six economies accounting for 90 per cent of exports).

The average applied tariffs on environmental goods in the Asia-Pacific region in 2019 was 5.78 per cent, lower than the average tariff on all goods (6.12 per cent for the same economies), and slightly lower than in 2015 (5.82 per cent). The averages ranged from 14.46 per cent in Pakistan to 0 per cent in Singapore (figure 2.5). The variation within countries with respect to specific product groups is slight, but in general, the lowest tariffs are placed on environmental monitoring, analysis and assessment equipment (simple average of 5.7 per cent), and the highest is placed on "natural resource protection" (simple average of 7.24 per cent).

"The average applied tariffs on environmental goods in the Asia-Pacific region in 2019 was lower than the average tariff on all goods, and slightly lower than in 2015."

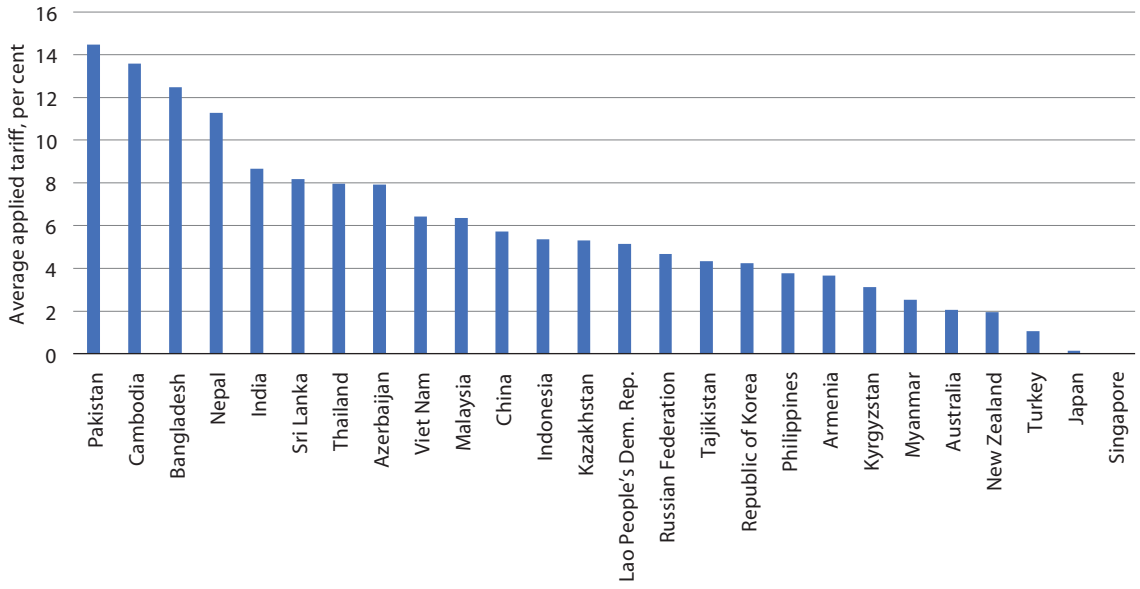
Reducing tariffs in such products can accelerate progress towards addressing climate change and be achieved through unilateral actions or as part of trade agreements. Indeed, zero tariffs on environmental goods is the cornerstone of the ongoing negotiations of the WTO Environmental Goods Agreement (WTO, 2015).[4] APEC members (using the same list) aim to reduce applied tariff rates to 5 per cent or less.[5] Similarly, AACTS negotiations seek to eliminate tariffs on environmental goods (albeit with a different list that is based on this 2012 APEC list).

"Environmental goods are subject to a significant but lower number of NTMs than other goods in the Asia-Pacific region."

Turning to NTMs,[6] on average, environmental goods are subject to a significant but lower number of these

[4] Since commencement of negotiations in 2014, the number of participants has increased to 46 WTO members and their combined trade accounts for the majority of global trade in environmental goods.
[5] As of March 2021, 19 APEC members have reached that criterion (APEC, 2021b).
[6] NTMs are defined as policies other than ordinary customs tariffs that can affect trade prices or quantities or both. As discussed in *Asia-Pacific Trade and Investment Report 2019: Navigating Non-Tariff Measures towards Sustainable Development*, NTMs play an increasingly important role in affecting the movement of goods between countries in lieu of declining tariffs. Many technical NTMs, such as technical mandatory standards or sanitary and phytosanitary measures, have legitimate and necessary purposes that help to achieve sustainable development. Indeed, some of such NTMs help address climate change (ESCAP and UNCTAD, 2019).

Figure 2.5 **Average applied tariffs on environmental goods in the Asia-Pacific region, 2019**



Source: Authors' calculations based on data from World Bank World Integrated Trade Solution (WITS) (https://wits.worldbank.org/).

measures than other goods in the Asia-Pacific region. Figure 2.6 shows country-level prevalence scores of NTMs affecting trade in environmental goods.[7] On average, in the region, imports of environmental goods are subject to 1.18 non-technical NTMs, and exports are subject to 1.28 NTMs. This compares favourably to an average of 2.5 NTMs on all imported goods (ESCAP, 2019). Notably, the vast majority of export and import-related NTMs are not targeting environmental goods specifically, but they are caught up in regulations applied to broader lists of products. As such, Governments could follow the COVID-19 example, in which goods in essential products lists were given specific consideration in trade treaties, multilateral agreements and unilateral liberalization efforts of tariff and NTMs, and apply similar efforts to facilitate trade in environmental goods.

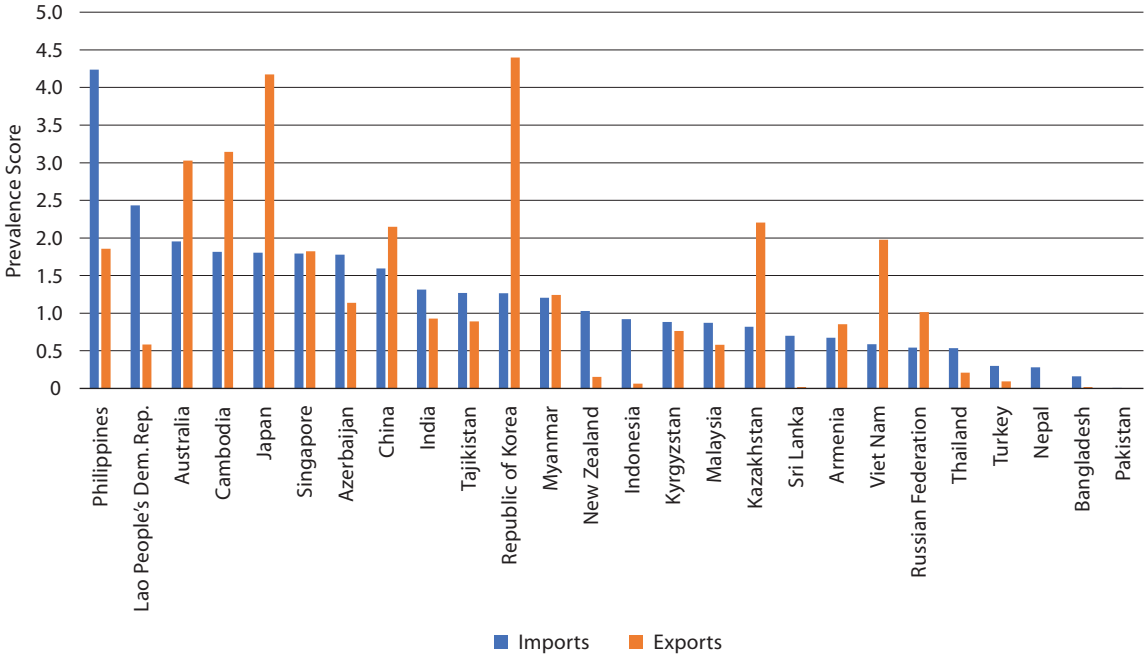
The most common applied NTMs are from the International Classification of Non-tariff Measures (ICNTM)[8] Chapter E (Non-automatic licensing, quotas, prohibition and quantity control measure other than for SPS or TBT reasons), followed by chapter F (Price-control measure, including additional taxes and charges). Every economy in the Asia-Pacific region has applied at least one Chapter E NTM to environmental goods, and all but four economies in the sample have applied at least one measure from chapter F.

As noted, some NTMs can be challenged under WTO rules. For example, the support from Canada for renewable energy generation was challenged by Japan and the European Union in 2014 – both claiming the support was discriminating against foreign equipment suppliers (WTO, 2014a; WTO, 2014b; WTO, 2021). The United States imposed countervailing measures on wind towers and solar panels (among other products) originating from China in 2012, which was subsequently challenged (WTO, 2021). The United States also challenged the domestic content requirement set by India for solar cell power generation in 2013 (WTO, 2018), and in 2016, India challenged steps taken by the United States relating to domestic content requirements and certain subsidies in the renewable energy sector (WTO, 2019). As the COVID-19 build-back-better spending is predicted to involve such sectors, it is

[7] Prevalence scores are the average number of NTMs applied to exports or imports of certain products.
[8] See the introduction in (ESCAP and UNCTAD, 2019).

Figure 2.6

Prevalence scores of non-technical NTMs affecting trade in environmental goods in the Asia-Pacific region, 2019



Source: Authors' calculations based on data from UN Comtrade (https://comtrade.un.org/).

important to ensure that WTO principles of non-discrimination are applied, and lessons learned are taken from such experiences.

While many NTMs have a legitimate non-trade policy objective, even well-intentioned technical NTMs generally increase costs associated with trade in affected goods. In such cases, it is necessary to streamline them (for example, by basing them on international standards) or address procedural obstacles through trade facilitation (chapter 5). Non-technical NTMs, on the other hand, are generally considered to be "non-tariff barriers" and can be targeted for removal. In the early stages of the COVID-19 pandemic when personal protection equipment was in short supply globally, Governments around the world temporarily, and in some cases permanently, removed measures restricting imports of essential equipment (ESCAP, 2021b). Arguably, given the urgency of climate change, a low hanging fruit could be to remove non-tariff barriers that affect trade in environmental goods.

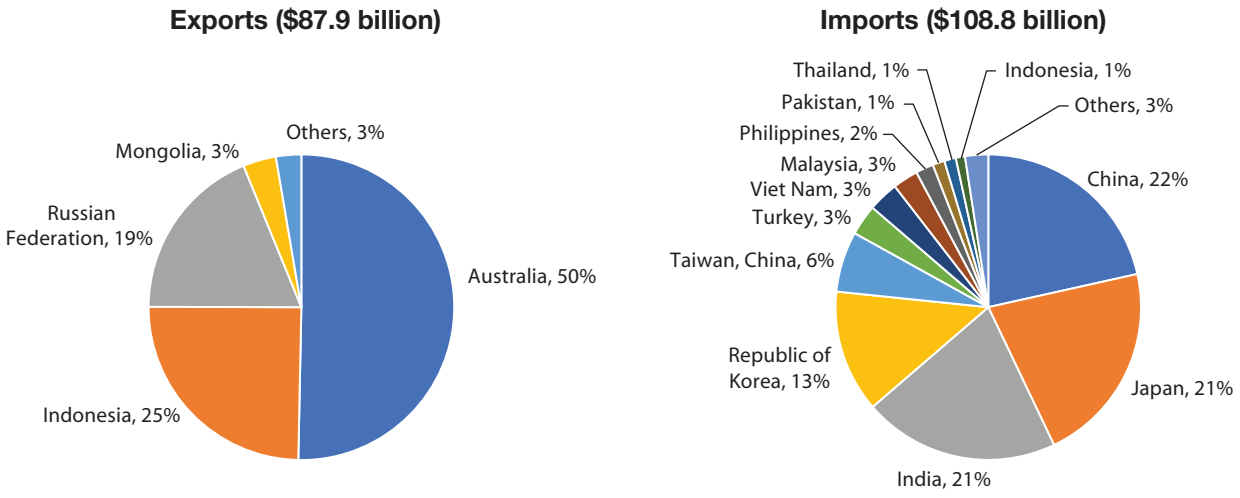
2. Trade in carbon-intensive fossil fuels

Contrary to environmental goods, trade in carbon-intensive fuels, and specifically in coal, which emits as much as twice the amount of CO2 equivalent of GHG emissions as compared to natural gas (Mac Kinnon, Brouwer and Samuelsen, 2018; Dones, Heck and Hirschberg, 2004),[9] is not desirable from the perspective of climate action. As such, over time, carbon-intensive fuels' share in trade should decline and they should be subject to higher tariff and non-tariff burdens. Notably, many cost-effective and market-ready technologies that can be used for the deployment of cleaner fuels and technologies in electricity generation, including gas and renewables are available (ESCAP, 2021b).

"On average Asia-Pacific economies have increased the share of carbon-intensive fossil fuels in their total trade."

[9] Specifically, HS 2701: coal; briquettes, ovoids and similar solid fuels manufactured from coal; HS 2702: lignite; whether or not agglomerated, excluding jet; HS 2703 Peat: (including peat litter), whether or not agglomerated.

Figure 2.7 **Largest exporters and importers of carbon-intensive fossil fuels in the Asia-Pacific region, in 2019**



Source: Author's calculations based on data from UN Comtrade (https://www.unescap.org/stat/data).

On average, Asia-Pacific economies have increased the share of carbon-intensive fossil fuels in their total trade. Between 2015 and 2019, the amount of exports of carbon-intensive fossil fuels increased from $58 billion to $88 billion and the share of total exports rose from 0.9 to 1.2 per cent. For imports, the amount increased from $68 billion to $108 billion and the share of total imports rose from 1.2 to 1.6 per cent. Four regional economies, Australia, Indonesia, the Russian Federation and Mongolia, accounted for 97 per cent of the total carbon-intensive fossil fuels exports from the Asia-Pacific region in 2019. The largest importers in the region were China, Japan, India, and the Republic of Korea (figure 2.7). The top four exporting economies increased their exports of carbon-intensive fossil fuels by 55 per cent over that time period, whereas the rest of Asia-Pacific economies decreased their exports of carbon-intensive fossil fuels by 36 per cent, by value. Notably, the net weight (quantity of coal) of the top four exporters increased only by 15 per cent, indicating that an increase in prices is driving the increase in value and share of exports. On the import side, the top 12 importers (depicted in figure 2.7), which accounted for 98 per cent of imports, increased their carbon-intensive fossil fuels imports (by value) by 65 per cent, whereas, for the rest of the importers, the value of the imports decreased by 18 per cent.

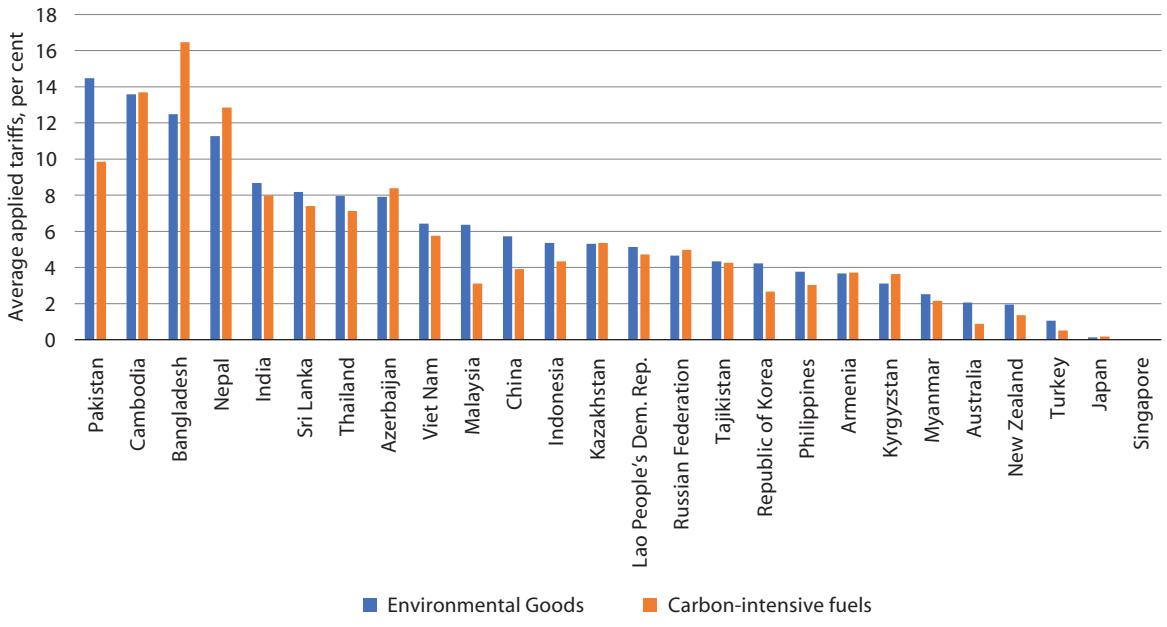
"In Asia and the Pacific, average tariffs applied on carbon-intensive fossil fuels are lower than the tariffs applied on the environmental goods."

In the Asia and Pacific region, average tariffs applied on carbon-intensive fossil fuels in 2019 were 5.32 per cent, lower than the tariffs applied on the environmental goods (see figure 2.8 for a comparison). In 16 out of 26 economies examined in the region, average applied tariffs on carbon-intensive fossil fuels were lower than those on environmental goods. The reasons behind this are most likely political economy – producers lobbying for lower input prices (electricity generation) for a competitive advantage and higher protection in potentially lucrative environmental goods industries.

Even more striking is the discrepancy in prevalence scores of non-technical NTMs applied to carbon-intensive fossil fuels when compared to environmental goods. Apart from a few notable examples (Japan, the Lao People's Democratic Republic, Nepal and the Philippines), in 2019, 21 out of 26 economies examined had, on average, more non-technical NTMs (non-tariff barriers) applied to imports of environmental goods than on imports of carbon-intensive fossil fuels. In seventeen economies, no non-technical NTMs were applied to carbon-intensive fossil fuel imports.

Figure 2.8

Average applied tariffs on environmental goods versus carbon-intensive fossil fuels



Source: Authors' calculations based on data from World Bank World Integrated Trade Solution (WITS) (https://wits.worldbank.org/)(accessed 10 June 2021).

"More non-technical NTMs (non-tariff barriers) are being applied to imports of environmental goods than on imports of carbon-intensive fossil fuels."

As noted at the outset of this report, the most pertinent type of NTMs applied to fossil fuels actually encourages their consumption – subsidies. While not part of the index due to data limitation (there is a placeholder in UNCTAD-led NTM data collection for subsidies, but at this stage, relevant data are not actively being collected), it is nevertheless important to stress the significance of subsidies in contributions to GHG emissions (box 2.2).

Box 2.2

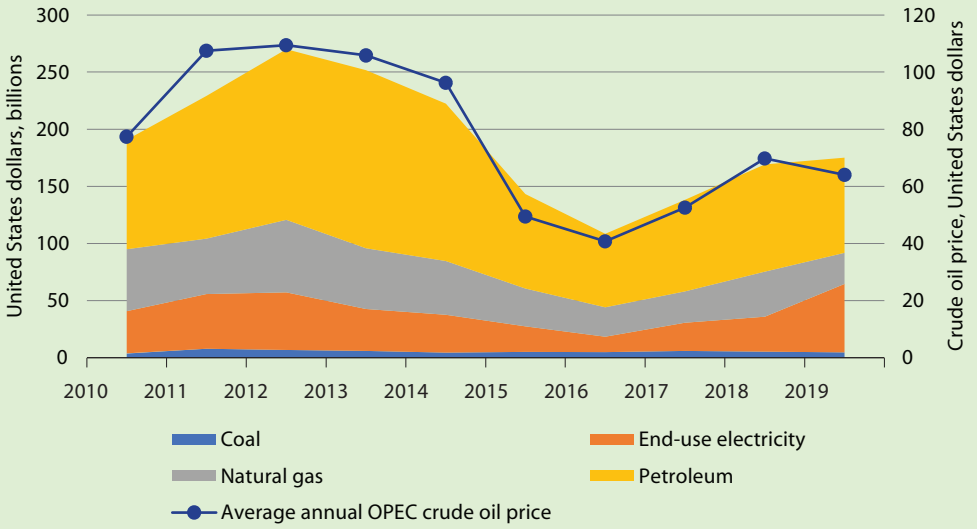
Fossil fuel subsidies

Fossil fuel subsidies are explicitly included in the SDG framework under indicator 12.c.1 "Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels". Target 12.c seeks to "rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities". What exactly are subsidies? IEA defines subsidies as "any government action that lowers the cost of energy production, raises the revenues of energy producers, or lowers the price paid by energy consumers" (Chelminski, 2018).

Box 2.2 *(continued)*

In 2019, Asia-Pacific economies spent more than $175 billion on fossil fuel subsidies (figure), lower than $270 billion spent in 2012. The difference can be equated to changes in global oil prices. Eliminating fossil fuel subsidies would achieve the dual objective of reducing government expenditure and helping to address GHG emissions.

Figure. Fossil Fuel Subsides in the Asia-Pacific region



Source: Authors' calculations based on data from Climate Watch (2020) (accessed May 2021).

IEA (2013) estimated that "even a partial phase-out of fossil fuel subsidies would generate 12 per cent of the total reduction needed by 2020 to achieve the 2°C target".

It should be noted that the trend of declining global coal demand will affect some economies in the region particularly hard. Export revenues and related taxes are often used to subsidize domestic coal power prices, establish infrastructure in coal regions and employ workers. Coal producers, therefore, need to anticipate the transition and plan to manage it (ESCAP, 2021b).

The most common stated goal of such subsidies is to support low-income households. However, such subsidies tend to be regressive, meaning that the largest beneficiaries are those who can better afford unsubsidized products. Other, more progressive tools, such as cash transfers to low-income households, are often lauded as being more suitable and sustainable policy tools.

Phasing out fossil fuels can be painful. For example, such actions have led to civil unrest in parts of Asia and, more recently, in Latin America and the Middle East. The recent yellow-vest protests in France originated from a proposed increase in fuel taxes. A successful example, however, occurred in the Asia-Pacific region. In 2015, President Jokowi sold a proposal for reforms in Indonesia by promising free schooling and health care in exchange for higher petrol prices. Having an offer that resonates makes a huge difference (Freitas, 2021).

3. Trade in emission intensive goods

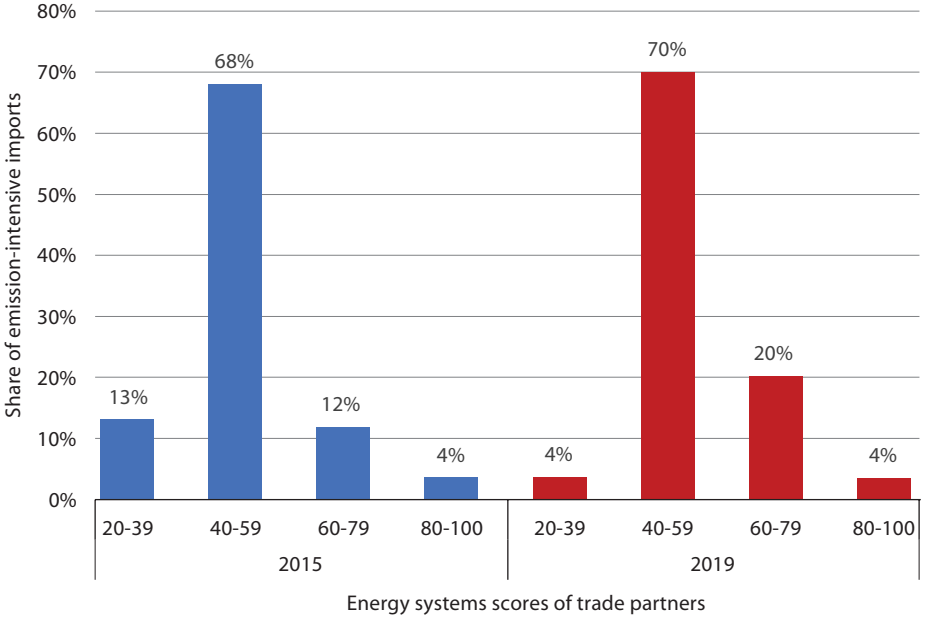
Emission-intensive goods are comprised of more than 1,300 products defined at 6-digit level of the HS (2012) based on the Energy Information Administration (EIA) publication *International Energy Outlook 2016* (EIA, 2016) and the Intergovernmental Panel on Climate Change (IPCC) fifth assessment report (IPCC, 2014). The list includes products, such as chemicals, ferrous and non-ferrous metals, nonmetallic minerals, pulp, paper, etc. The indicators used to assess an economy's "climate-smart" trade in emission intensive goods are the share of these goods in trade (the lower the share, the less emissions) and the average climate-smart energy systems score of the exporting partners for imports or the economy's own energy systems score for exports (a higher score is associated with an energy system that emits less GHG to the environment in general and in the process to produce energy intensive goods). The premise is that an economy can reduce its contribution to the GHG emissions by (1) reducing the share of emission intensive goods in its trade and/or by (2) sourcing the relevant goods from countries that have more climate-smart energy systems for imports, and by improving its own energy system for exports.

"Emission intensive import subindex of SMARTII has improved drastically between 2015 and 2019 in the Asia-Pacific region."

The emission intensive import subindex of SMARTII has improved significantly between 2015 and 2019. The better results were primarily driven by improvement in the energy systems scores of the economies that export this type of goods to the Asia Pacific region (the source of imports for regional economies). In 2019, energy-intensive goods comprised 18 per cent and 26 per cent of total exports and imports in the region, respectively – the shares have not shifted significantly since 2015. Figure 2.9 shows that as compared to 2015, the share of such goods imported from countries that have energy systems score within the range of 20 to 30 decreased to only 4 per cent, while the shares of imports from partners ranked within the ranges of 40 to 59 and 60 to 79 increased by 2 per cent and 8 per cent, respectively.

Figure 2.9

Structure of emission-intensive goods imports by climate smart energy systems scores of the exporting partners, 2015 versus 2019



Source: Authors' calculations based on data from IEA (2021).

Taken together, these indicators highlight that consideration should be given not just to the effect of transportation of products on the environment, but also on the GHG footprint in the production process. For example, aluminum smelting – a highly electricity-intensive process – while essentially a uniform and standardized commodity product – can have a very different GHG footprint, depending on the electricity mix used. In New Zealand, the Tiwai Point Aluminum Smelter uses 13 per cent of the country's electricity, however,100 per cent of it is generated through a dedicated hydropower plant, which produces more than 300,000 tonnes of aluminum annually, of which 90 per cent of it is exported (NZAS, 2018). On the other hand, aluminum smelted in China primarily relies on electricity generated from coal-powered plants. Chinese aluminum smelting operations produce nearly as much CO2 emissions as Australia as a whole (EMBER, 2021). In principle, the cost of production processes should be internalized in the prices of carbon and in the border carbon adjustment taxes. It should also be noted that an investigation brought to WTO by the United States on subsidies to producers of primary aluminum in China is ongoing (WTO, 2017) and that the European Commission is conducting an investigation on aluminum from China (European Commission, 2021).

"The production process is just as important – if not more important, in the net effect of trade on GHG emissions."

Discriminating against imports based on the production process to account for embodied emissions, however, can encounter challenges under current multilateral trade rules. Such actions may run counter to the principle of non-discrimination and national treatment obligations, where "like" products from different economies, as well as domestic products, need to be treated in the same way. Accordingly, discriminating based on embodied emissions would depend on interpretation of the "like" principle – something that is done on a case-by-case basis and can be contested at WTO (Brandi, 2017). Voluntary labelling, however, is not governed by WTO rules and may involve making a compromise when giving consumers information on embedded emissions (discussed in the latter part of the next section).

4. Use of climate-smart NTMs

Non-tariff measures can be used to alter the characteristics of goods traded in a way that helps to address climate change. The extent to which an economy employs import and export NTMs to address climate-related issues is captured by using indicators, such as share of imports regulated by at least one climate-related NTM (coverage ratio),[10] share of NTMs with climate-related objectives and the number of distinct climate issues addressed by NTMs, such as energy efficiency, GHG emissions and deforestation through illegal logging or unsustainable forest management. Whether an NTM has a climate-related objective is determined with the help of automated keyword mapping of the NTMs present in the UNCTAD TRAINS database of NTMs.[11]

Examples of climate-smart NTMs are provided in table 2.1. More than 80 per cent of NTMs imposed based on climate-related objectives are technical measures, specifically ICNTM chapter B (technical barriers to trade (TBT)). Concerning non-technical measures, most countries, being signatories to the Montreal Protocol, have NTMs addressing trade in ozone-depleting substances, which are also potent greenhouse gases (such NTMs are typically classified as non-technical measures falling under ICNTM Chapter E – "non-automatic licensing"). There are also a few Chapter E measures regulating trade in timber and timber products, addressing the issue of illegal timber trade, which contributes to deforestation and consequently to climate change through emission of GHGs and reduced rates of carbon sequestration (IPCC, 2019).

"Six of the economies in the region examined do not have any climate-related NTMs in place covering existing trade."

The author's analysis suggests that six of the economies examined do not have climate-related NTMs in place covering existing trade (figure 2.10).[12] With a few exceptions, Asia-Pacific economies score

[10] The coverage ratio captures how much of an economy's trade is subject to NTMs.
[11] Mapping methodology was originally developed for ESCAP and UNCTAD (2019) and further improved for the purpose of SMARTII index development.
[12] The key is existing trade because most countries tend to have similar prohibitions on chlorofluorcarbons (CFCs) based on the Montreal Protocol.

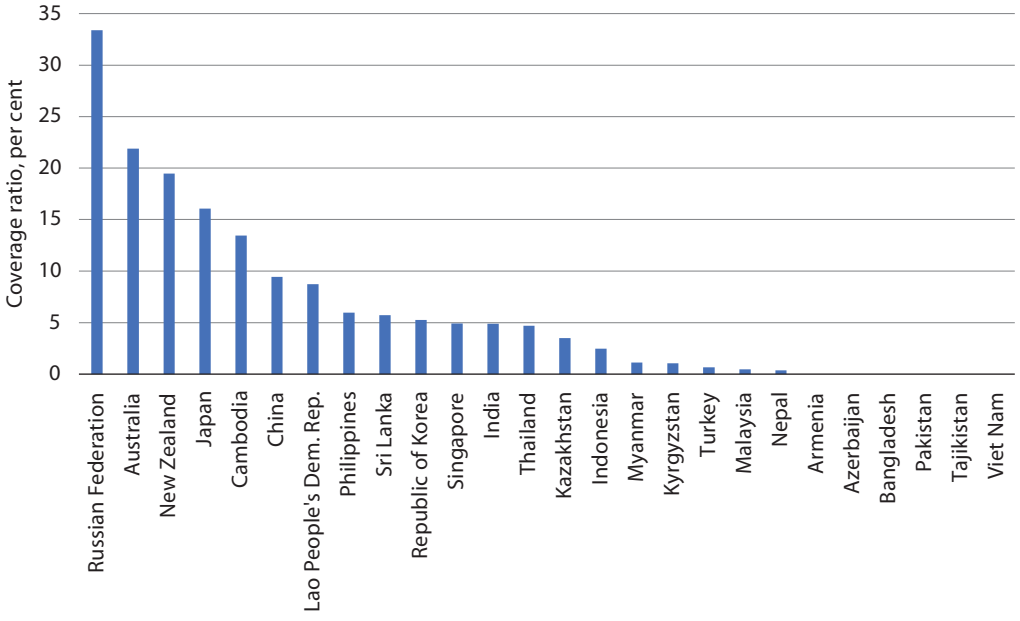
Table 2.1

Examples of climate smart NTMs

Imposing economy	Objective category	Description
Australia	Emissions from machinery and vehicles	Requirement of application of fuel consumption labels and energy consumption labels to vehicles (ICNTM B31).
China	Energy efficiency, other	Technical requirement regarding the minimum allowable level of energy efficiency of self -ballasted fluorescent lamps has been specified (ICNTM B7).
Brunei Darussalam	Deforestation	Prohibition on felling certain trees (ICNTM P14).
New Zealand	Greenhouse gas emissions	…The levy applies to a range of imported goods including fridges, freezers, heat pumps, air-conditioners, and refrigerated trailers. It is linked to the price of carbon and varies between items to reflect the amount of gas, the specified gas and its global warming potential (ICNTM F73).
Afghanistan	Greenhouse gas emissions	Chloro Floro Carbons (CFS) and Products containing CFS and certain halons and products containing them are banned from import to Afghanistan (ICNTM E32).

Figure 2.10

Coverage ratio of climate-smart NTMs affecting imports in the Asia-Pacific region, 2019[13]



Source: Authors' calculations based on data from UNCTAD (2021)

[13] Although the coverage ratio is much higher for the Russian Federation than, for example, for Australia and New Zealand, a closer look at the data shows that the Russia Federation has much fewer climate-related NTMs addressing less climate-related issues, but each measure is less product-specific and is applied to a much wider set of 6-digit HS codes. In contrast, Australia and New Zealand apply non-tariff regulation that is more detailed and more product specific, which makes each individual NTM applicable to a smaller group of products. Two other components included in the climate-smart NTM indicator makes it possible to reflect the state of climate-smart NTMs use by an individual economy more accurately.

rather low on the climate-smart import NTMs subindex. In 2019, the economies, on average, applied one or more climate-related NTMs to only 6.2 per cent of their imports, and the share of climate-related import NTMs in the bulk of all import NTMs, on average, was 1.6 per cent.

As noted, common technical requirements include labelling of energy efficiency and emission standards. Other notable examples are phasing out usage (and import) of incandescent lighting in lieu of more efficient light bulbs. As noted in chapter 1, in addition to CO2, it is important to consider other GHGs. One avenue with a potentially significant impact is ensuring proper disposal of appliances and machinery containing fluorinated gases, such as air conditioning equipment (including in motor vehicles) and refrigerators. Fluorinated gases are tens of thousands times more potent than CO2, but are generally improperly disposed of in developing countries. As such, requiring importers to ensure availability of proper disposal of such gases in a product lifecycle could prove to be a low hanging fruit in addressing GHG emissions.

Looking ahead, it is likely that NTMs will play an increasingly prominent role in addressing climate change – within the Asia-Pacific region, as well as affecting Asia-Pacific countries' exports. Many Governments are setting targets to phase out vehicles with internal combustion engines and replace them with electric types – this kind of regulation is precisely an NTM when concerning imports (Rowlatt, 2021). It is estimated that by 2040, 40 per cent of all new cars sold globally will be electric, leaping to virtually 100 per cent by 2040 (Rowlatt, 2021).

"NTMs, such as mandatory labelling or setting standards for energy efficiency of production processes, may invite challenges through WTO, and voluntary labelling can be used in lieu."

As discussed in the previous section, however, regulating imports based on embodied carbon by applying beyond border carbon adjustment taxes (discussed in chapter 6), requiring mandatory labelling or setting standards for energy efficiency of production processes, may lead to challenges through WTO. In lieu of such NTMs, voluntary ecolabelling may be employed, making it important to adopt common standards to ensure trade costs are not unnecessarily increased. As mentioned previously, one of the areas of work in the AACTS negotiations is developing best practices for such eco-labelling (box 2.3).

Box 2.3

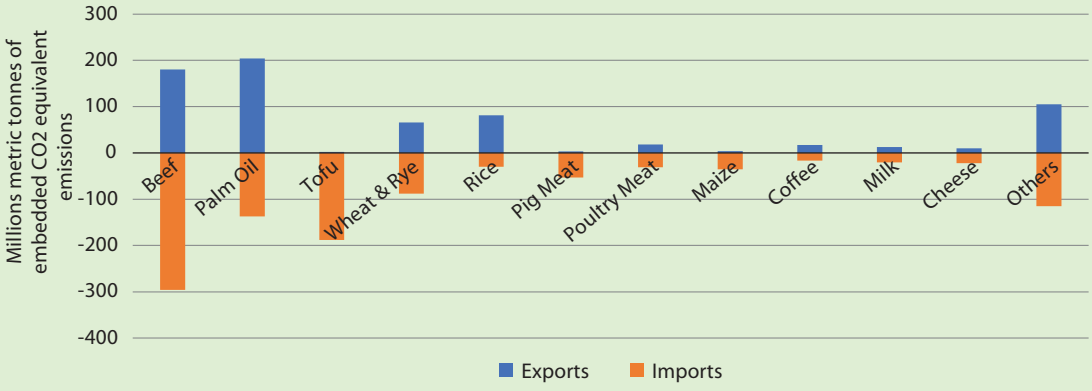
Eco-labelling and GHG emissions across the supply chains

Regarding the efficacy of eco-labelling, some research indicates that a majority of consumers may be willing to change their eating habits to help reduce the negative environmental impact; a survey of 10,000 consumers in Europe revealed that two thirds of the respondents support carbon labelling of products (Carbon Trust, 2020). Food production contributes up to 26 per cent of global carbon emissions (Poore and Nemecek, 2018). In this sector, it is sometimes argued that consumers should "buy local" to help the environment, thereby implying that transportation constitutes the bulk of related GHG emissions. In fact, it has been suggested that "food miles" labelling be mandatory on food products. However, transportation typically constitutes only a tiny fraction of GHG emissions in food products – the bulk of emissions actually comes from food choices themselves. For example, production of 1 kg of beef is estimated to contribute to 60 kg of CO2 equivalent GHG emissions (out of that only 0.3 kg is due to transportation – the bulk of GHG emissions are due to methane emissions through belching (39 kg) and forest loss due to pasture increases (16 kg)). Dark chocolate is nearly as bad as beef when it comes to land-use change – the production of 1 kg of dark chocolate contributes to 14 kg of CO2 equivalent GHG emissions due to forest loss. Poultry (a non-ruminant animal) produces nearly 10 times less total GHG emissions per kg than beef. A kilo of nuts, on the other hand, is almost carbon neutral, as emissions from growth, transport and retail are nearly offset by carbon storage in the wood of the nut trees.

Box 2.3 *(continued)*

As such, there is a trend to attract climate change conscious consumers with "CO2 per calorie equivalent" labelling. Looking ahead, carbon pricing and border adjustment taxes will likely start with carbon-intensive manufactured products, such as steel, concrete and aluminum (see chapter 6). Agricultural products may follow suit. As many of the developing countries in the Asia-Pacific region rely heavily on agricultural exports, this may entail a significant implication to agricultural exporters in the region. In particular, Australia, Indonesia, Malaysia and New Zealand are likely to be particularly affected. It is worth noting, however, that the Asia-Pacific region as a whole is a net importer of CO2 equivalent emissions embedded in agricultural products (see figure). As such, for most of the economies in the region, it may indeed be worthwhile to potentially implement carbon tariffs as part of their trade-related climate action, particularly on high emissions to calorie ratio foods, such as beef.

Figure. CO2 equivalent emissions embedded in exports and imports of Asia-Pacific region, by broad food sector



Source: Authors' calculations based on trade data from UN Comtrade (https://www.unescap.org/stat/data) (accessed August 2021), and data on embedded emissions from Poore and Nemecek (2018).

Note: Computation details are available in Kravchenko and others (forthcoming).

C. CLIMATE-SMART INVESTMENT ENVIRONMENT AND TRADE FACILITATION

1. Climate-smart investment environment

The extent to which the **investment environment** in a given economy is climate smart is approximated with the use of four subindices, which capture the state of an economy's energy system fuel mix and efficiency, its regulations on renewable energy and energy efficiency deployment, the extent to which it addresses climate change concerns in its regional trade and economic partnership agreements and revealed comparative advantage in environmental goods exports and environmental technologies.

"In the region, regulatory scores for deployment of renewable energy and energy efficiency at the national level and the share of RTAs with climate related provisions has increased significantly."

In the region, significant increases in regulatory scores for deployment of renewable energy and energy efficiency at the national level and the share of RTAs with climate-related provisions have increased significantly (further discussed in

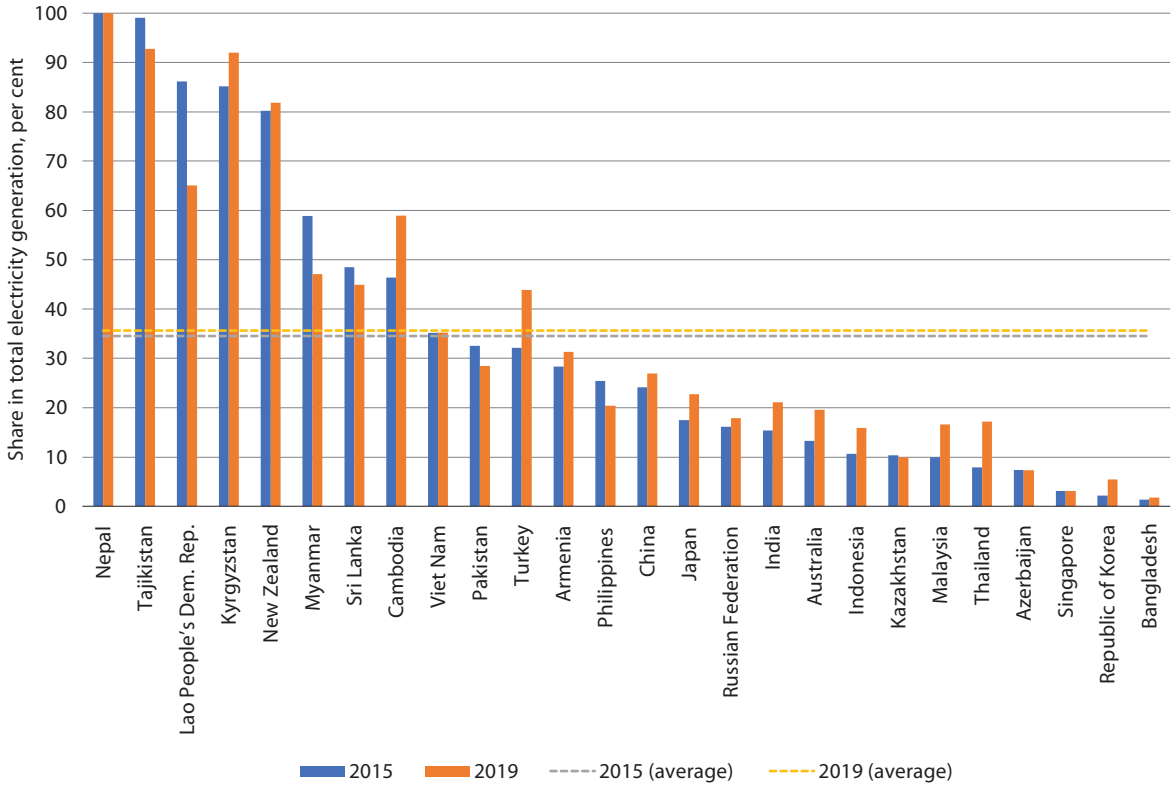
chapter 4). Between 2015 and 2019, progress was made in the region in the following areas: developing and putting in place national policies and regulations; agreeing to bilateral and plurilateral commitments in support of sustainable and low-carbon energy systems development and economic activity management; improving the environmental performance of traded goods; and promoting trade of environmental goods and technologies.

"The Asia Pacific region, on average, tends to have a lower level of specialization in export-worthy environmental goods and patent-worthy environmental technologies compared to the rest of the world."

However, the revealed comparative and technological advantage indicators suggest that the Asia-Pacific economies, on average, tend to have a lower level of specialization in export-worthy environmental goods and patent-worthy environmental technologies as compared to the rest of the world. The overall subindex of investment in environmental technologies and goods has declined marginally over the five-year period 2015–2019. Options for the private sector to consider to make their participation in trade and investment more climate smart is explored further in chapter 3.

Encouragingly, many economies in the Asia-Pacific region are recording a high share of renewable energy in electricity generation, as shown in figure 2.11. The average, however, obscures the fact that some of these economies still predominantly rely on coal. In 14 out of 26 economies evaluated, the share of coal in electricity generation has increased since 2015, and the regional average has also increased (figure 2.12). Asia and the Pacific as a region accounts for 75 per cent of the global coal-fired generation capacity (ESCAP, 2021). It should be noted, however, that China upgraded its power generation infrastructure, which requires less input (coal) and releases less pollution. The composition

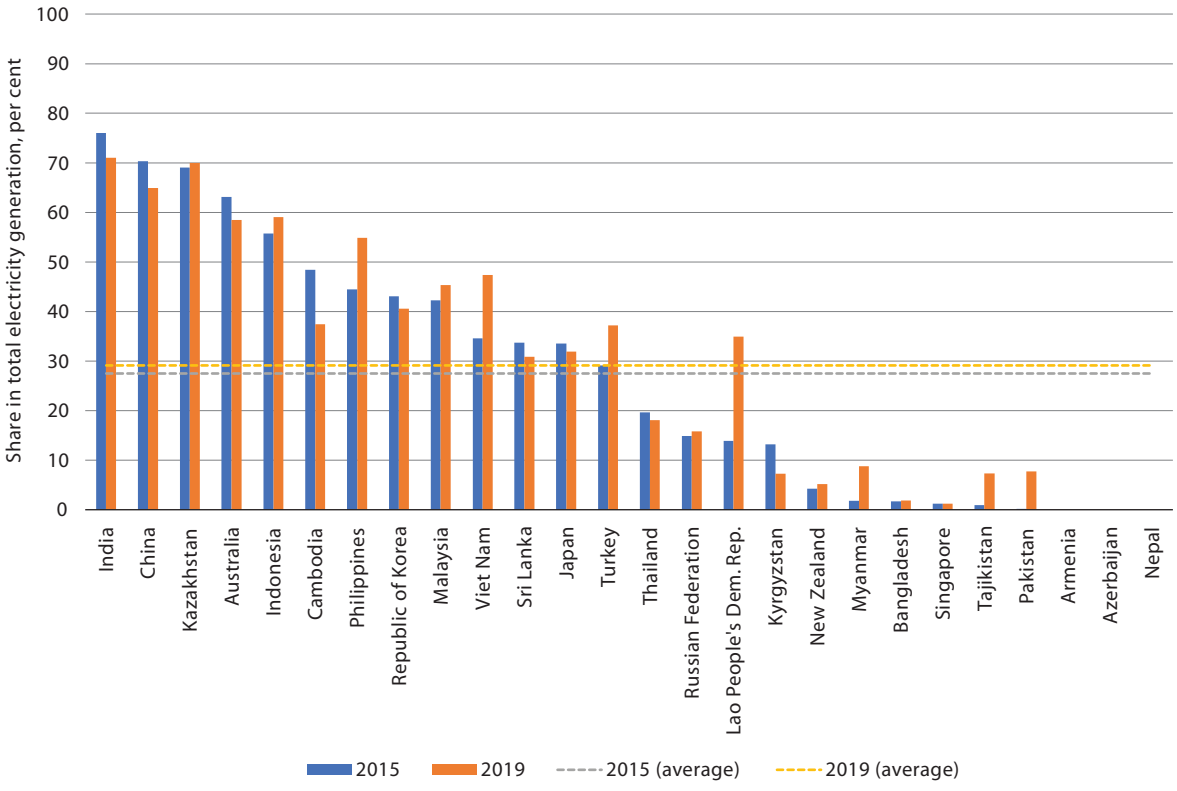
Figure 2.11 **Share of renewable energy in electricity generation**



Source: Authors' calculations based on data from IEA (2021).

Figure 2.12

Share of coal in electricity generation



Source: Authors' calculations based on data from IEA (2021).

of Chinese coal fleet has moved sharply towards supercritical and ultra-supercritical technologies, which are much cleaner than the subcritical technologies of older generations. More recently, the country has shown a preference towards putting up with power shortages instead of reverting to consuming more coal during peak demand times (He, 2021).

Some reports suggest that fossil fuel power demand has peaked globally, and that it is now more cost-effective to invest in green power (Carbon Tracker, 2021). In Viet Nam, for example, solar power was near zero capacity as late as 2017. To support the industry, the Government introduced a $0.09 per kilowatt-hour subsidy for solar farms on the condition that they start operations within two years. It was expected that 850mw of capacity would be installed under the scheme. By the end of 2019, a whopping 5 gigawatts of capacity has been installed (The Economist, 2020). Power from large solar farms in South-East Asia is projected to be competitive with most coal plants within five years. The key to achieving this is to implement trade and investment policies that facilitate uninhibited access to environmental goods and technologies, and related services. COVID-19 recovery funding (as well as more creative financing options – see box 2.4) is providing an opportunity to invest more in green power.

Box 2.4

Offsetting carbon emissions overseas

Addressing climate change to a large extend relies on policies to nudge consumers and producers into more climate-smart choices within each economy's borders. A little-known option available under the Paris Agreement is the ability to offset domestic emissions through climate projects abroad. To date, the only country taking advantage of this opportunity is Switzerland (whose citizens have recently rejected proposed car fuel levies and a tax on air tickets to address GHG emissions (BBC, 2021). The country has in place domestic legislation that allows it to offset up to 25 per cent of its emissions reductions abroad (Burkard and Medilanski, 2020). In November 2020, Switzerland and Peru signed the first agreement for such international offsetting (Dupraz-Dobias, 2020). Under the terms of the agreement, a Swiss-based foundation will fund certain projects, which cannot be double counted towards Peru's own commitments. Projects under consideration include initiatives, such as $50 million green credit line for small and medium-sized businesses to invest in energy efficiency and electric buses. In May 2021, the Governments of Switzerland and Thailand signed a joint statement intending to implement a similar carbon offsetting scheme in Thailand (Mena Report, 2021). Other Asia-Pacific countries may consider raising finance in a similar fashion as part of their COVID-19 recovery plans under the understanding that any resultant emission reduction will not be counted towards their own commitments, and the law of diminishing returns implies that further reductions may come at a marginally higher cost.

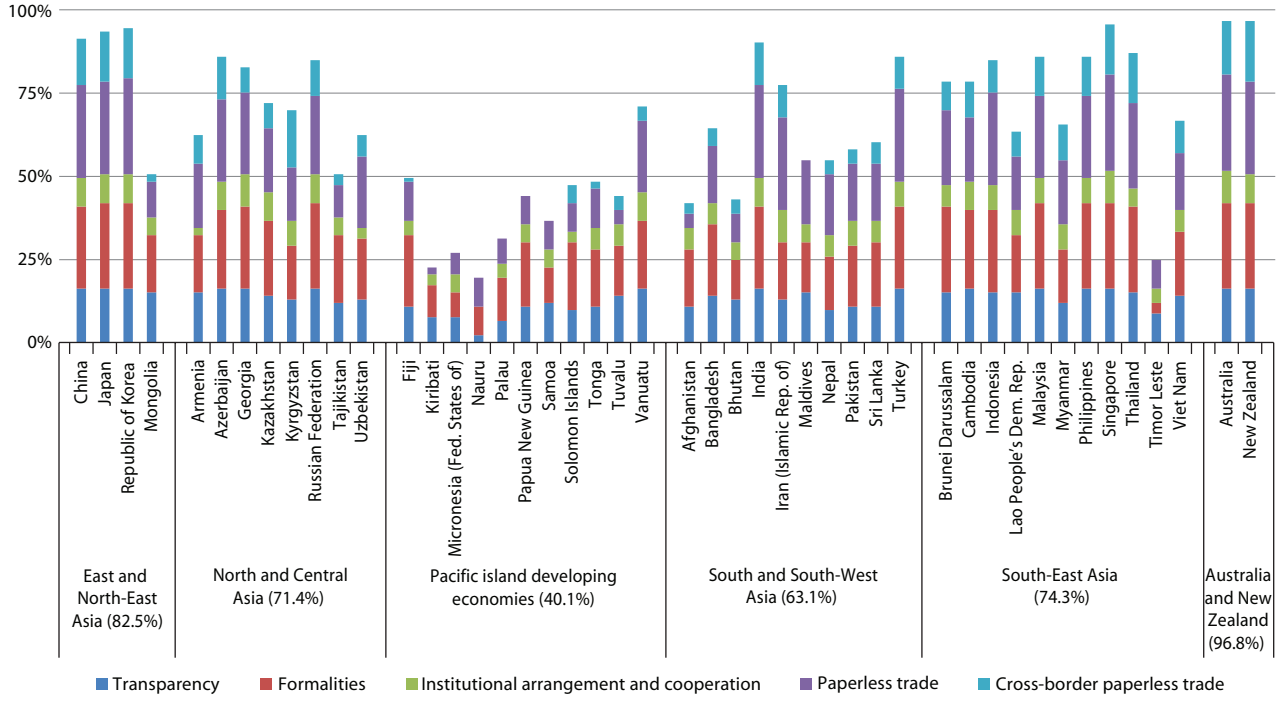
2. Trade facilitation

"Trade facilitation is the component of SMARTII in which the Asia Pacific region attained the highest score in 2019, supported by a significant improvement in the transparency and efficiency of trade procedures since 2015."

Trade facilitation is the component of SMARTII in which the Asia Pacific region attained the highest score in 2019 (71.31), supported by a significant improvement in the transparency and efficiency of trade procedures since 2015 (55.3). The latest data from the UN Global Survey on Digital and Sustainable Trade Facilitation (see figure 2.13) reveals that the region continued to make progress between 2019 and 2021. While the situation varies greatly across countries and much remains to be done, implementation of cross-border paperless trade, the electronic exchange and legal recognition of trade-related data and documents across borders, has picked up, in part because of the COVID-19 pandemic and the resulting physical distancing requirements.

The implementation of paperless trade facilitation affects GHG emissions through four main channels. Paperless trade eliminates physical documents and the need to transport them; it also reduces office work and need for storage. Accordingly, based on data from various micro-level import and export process analyses conducted by ESCAP since 2010, estimated emissions savings from trade facilitation in Asia and the Pacific are equivalent to those that could be absorbed by no less than 400 million trees, mostly driven by efficiency gains from handling data digitally. Still, the savings from trade digitization pale in comparison to the emissions from transport in international trade, an area in which there is a lot of scope for the region's economies to make progress (Duval and Hardy, 2021). This is discussed in more details in chapter 5.

Figure 2.13 **Trade facilitation implementation in the Asia-Pacific region, 2021**



Source: ESCAP, based on data from UN Global Survey on Digital and Sustainable Trade Facilitation (https://www.untfsurvey.org/) (accessed 20 July 2021).

D. CONCLUSION

As set forth at the beginning of this chapter, the intention of the SMARTII is to capture the extent of the participation of Asia Pacific economies in different trade and investment-related activities that contribute towards climate change exacerbation or mitigation, and support or hinder climate action.

Analysis of the underlying indicators has highlighted a certain dichotomy between what policies and regulatory tools set forth, and what is happening in trade and investment of a given economy. The data show that over the examined five-year period, the Asia-Pacific region made little progress towards improving energy infrastructure, investment in environmental technologies and goods, trade in carbon-intensive fuels, and trade in environmental goods and emission intensive goods. An exception to this is the import of emission intensive goods, which improved significantly, as the result of the positive changes in the energy systems scores of the exporters supplying this type of goods to the Asia-Pacific economies. This improvement is mostly attributable to exporters outside of the Asia-Pacific region, as the region's average energy systems scores have remained virtually unchanged.

The data show that over this period, significant progress was made in the development and implementation of policies and regulations that support deployment of energy efficiency and renewable energy technologies, including provisions addressing certain aspects of the climate change challenge in trade agreements, and even to some extent in using NTMs to regulate those characteristics of the traded products that can have an impact on climate change. Arguably, some of these policies and regulations are relatively new, and it takes time to transform policy into action. Accordingly, tracking SMARTII over the next few years may show the changes the policies are intended to yield.

Unsurprisingly, the index and its indicators reveal stark differences across Asia-Pacific economies, some of which are related to natural rather than

policy factors. Some economies have large shares of renewables and low shares of coal in electricity generation because they have abundant water resources and/or lack significant coal reserves. With a few exceptions, economies that are geographically large also tend to lose relatively more energy in transmission and distribution because of the length of their power lines. However, while such differences between economies impose limitations on the interpretation of the SMARTII and its indicators at a given point in time, tracking them over longer periods should provide useful insights into the overall trajectory of an economy's impact on climate change and climate action that is achieved through its participation in trade and investment.

Taking into account these considerations, the index reveals that the economies in the region have significant room for making their trade and investment increasingly climate smart, including by (a) reducing the tariff and non-tariff burden on trade in environmental goods and creating a policy and investment environment that stimulates invention and production of globally competitive environmental goods and technologies; (b) removing fossil fuel subsidies to boost sustainable energy technologies and encourage trading partners to do the same by negotiating relevant provisions into trade or economic partnership agreements (as appropriate, fossil fuel subsidies could be replaced by targeted policies supporting low-income and vulnerable households and small and medium-sized enterprises); (c) use NTMs to regulate the characteristics of traded goods that reduce their contribution to climate change during their use and disposal; (d) encourage importers to implement voluntary eco-labelling of emission intensive goods and food products; (e) deepening regional trade and economic partnership agreements to include more specific provisions to address climate change; and (f) remove inefficiencies in cross-border trade administration, which contributes not only to excessive transaction costs but also to unnecessary loss of resources, such as energy and paper.

Issues related to several of these recommendations are further explored in subsequent chapters of this report.

REFERENCES

Asia-Pacific Economic Cooperation (APEC) (2021a). APEC Ministers Responsible for Trade Meeting Joint Statement 2021. Wellington, New Zealand, 5 June. Available at https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Trade/2021_MRT.

_____ (2021b). APEC advances environmental goods tariffs cut. Press release, 11 March. Available at https://www.apec.org/Press/News-Releases/2021/0311_MAG.

BBC (2021). Swiss voters reject key climate change measures. 13 June. Available at https://www.bbc.com/news/world-europe-57457384.

Bond, Jordan (2021). New Zealand imported more than a million tonnes of 'dirty' coal last year. RNZ, 14 July, Available at https://www.stuff.co.nz/environment/climate-news/300356959/new-zealand-imported-more-than-a-million-tonnes-of-dirty-coal-last-year.

Brandi Clara (2017). Trade elements in countries' climate contributions under the Paris Agreement. ICTSD Issue Paper. Geneva: ICTSD.

Burkard, Reto, and Edi Medilanski (2020). Compensation climatique à l'étranger: le rôle pionnier de la Suisse. Available at https://dievolkswirtschaft.ch/content/uploads/2020/07/17_FL_Burkard_Medilanski_FR.pdf.

Carbon Tracker (2021). World at peak fossil generation as emerging markets adopt renewables. 13 June. Available at https://carbontracker.org/17875/.

Carbon Trust (2020). 2020 consumer research shows sustained support for carbon labelling on products. Press release, 23 April. Available at https://www.carbontrust.com/news-and-events/news/2020-consumer-research-shows-sustained-support-for-carbon-labelling-on.

Chelminski, Kathryn (2018). Fossil Fuel Subsidy Reform in Indonesia. In *The Politics of Fossil Fuel Subsidies and their Reform*, Jakob. Skovgaard, and Haro van Asselt (eds.). Cambridge, UK: Cambridge University Press:

Dones, Roberto, Thomas Heck, and Stean Hirschberg (2004). Greenhouse gas emissions from energy systems: comparison and overview. Paul Scherrer Institut Scientific Report 2003, vol. IV, pp. 27–40.

Dupraz-Dobias, Paula (2020). Swiss-Peruvian climate deal pioneers international cooperation. Swissinto.ch, 20 November. Available at https://www.swissinfo.ch/eng/swiss-peruvian-climate-deal-pioneers-international-cooperation/46169622.

Duval, Yann, and Simon Hardy (2021). A primer on quantifying the environmental benefits of cross-border paperless trade facilitation. ARTNeT Working Paper Series No. 2016. Bangkok: ESCAP.

Energy Informaton Administration (EIA) (2016). U.S. Energy Information Administraion, International Energy Outlook, chapter 7, Available at https://www.eia.gov/outlooks/ieo/pdf/0484(2016).pdf.

European Commission (2021). Case AD664 – Aluminium extrusions. Available at https://trade.ec.europa.eu/tdi/case_details.cfm?id=2449.

He, Laura (2021). China is facing its worst power shortage in a decade. That's a problem for the whole world. CNN, 30 June. Available at https://edition.cnn.com/2021/06/30/economy/china-power-shortage-intl-hnk/index.html.

Intergovernmental Panel on Climate Change (IPCC) (2014). Climate Change 2014 Mitigation of Climate Change Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge Univerity Press. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf.

_____ (2019). Climate change and land. Avilalbe at www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf.

International Energy Agency (IEA) (2013). Redrawing the energy-climate map: world energy outlook special report. Available at https://iea.blob.core.windows.net/assets/417cd627-fda9-470e-9380-1203a5315deb/WEO_Special_Report_2013_Redrawing_the_Energy_Climate_Map.pdf.

International Energy Agency (IEA) via Asia Pacific Energy Portal (2021). Coal % of Electricity Production, 1990-2019. Available at https://asiapacificenergy.org/#main/lang/en/graph/1/type/0/sort/0/time/[min,max]/indicator/[3032:3014]/geo/[KHM,LAO,VNM,ASPA]/legend/1/inspect/0.

Kravchenko, Alexey, and others (2019). Exploring linkages between non-tariff measures and the Sustainable Development Goals: a global concordance matrix and application to Asia and the Pacific. ESCAP Trade, Investment and Innovation Series, No. 4, December. Bangkok: ESCAP.

Mac Kinnon, Michael, Jacob Brouwer, and Scott Samuelsen (2018). The role of natural gas and its infrastructure in mitigating greenhouse gas emissions, improving regional air quality, and renewable resource integration. Progress in Energy and Combustion Science, vol. 64, No. 62–92.

McCulloch, Neil, and Redak Stefanski (2021). Fossil fuel subsidies amount to hundreds of billions of dollars a year – here's how to get rid of them. The Conversation, 11 February. Availabe at https://theconversation.com/fossil-fuel-subsidies-amount-to-hundreds-of-billions-of-dollars-a-year-heres-how-to-get-rid-of-them-153740.

Mena Report (2021). Switzerland and Thailand sign a Joint Statement on climate protection projects. 28 May. Available at https://www.proquest.com/docview/2533625215.

NZAS (2018). Aluminium – the metal of the future. Available at https://www.nzaluminium.co.nz/files/2598_20180706114606-1530834366.pdf.

New Zealad, Ministry of Foreign Affairs and Trade (2020). Agreement on Climate Change, Trade and Sustainability (ACCTS) negotiations. Available at https://www.mfat.govt.nz/en/trade/free-trade-agreements/trade-and-climate/agreement-on-climate-change-trade-and-sustainability-accts-negotiations/.

Poore, J., and T. Nemecek (2018). Reducing food's environmental impacts through producers and consumers. Science, vol. 260, No. 6392, pp. 987–992.

Rowlatt, Justin (2021). Why electric cars will take over sooner than you think. BBC, I June. Available at https://www.bbc.com/news/business-57253947.

Sauvage, J. (2014). The stringency of environmental regulations and trade in environmental goods, OECD Trade and Environmental Working Parpers, No. 2014.03. Paris: OECD Publishing. Retrieved from BBC: https://www.bbc.com/news/business-57253947.

Steenblick, Ronald (2005). Environmental goods: a comparison of the APEC and OECD lists. OECD Trade and Environemntal Working Paper No. 2005-04. Available at https://www.oecd.org/environment/envtrade/35837840.pdf.

_____, and Massimo Grosso (2011). Trade in services related to climate change: an exploratory analysis. OECD Trade and Environment Working Papers, No 2011/03. Paris: OECD Publiching.

The Economist (2020). Vietnam grapples with an unexpected surge in solar power. 25 January. Available at https://www.economist.com/asia/2020/01/25/vietnam-grapples-with-an-unexpected-surge-in-solar-power.

United Nation, Economic and Social Commions for Asia and the Pacific (2021a). *Coal Phase Out and Energy Transition Pathways for Asia and the Pacific*. Bangkok, ESCAP.

_____ (2021b). Extractive Industries, Sustianable Develpoment and the 2030 Agenda in Asia and the Pacific. 4 February. Available at https://www.unescap.org/events/2021/roundtable-extractive-industries-sustainable-development-and-2030-agenda.

_____ (2021c). Recent trends and developments in trade and investment in Asia and the Pacific: Note by the secretariat. (ESCAP/CTI/2021//Rev.1).

_____, and Untied Nation Conference on Trade and Development (UNCTAD) (2019). Navigating Non-Tariff Measures towards Sustainable Development. United Nations publication, Sales No. E.19. II.F.14.

United Nations, Statistics Division (n.d.). Classifications on economic statistics: CPC, provisional – Code 940. Available at https://unstats.un.org/unsd/classifications/Econ/Detail/EN/9/940. Accessed on 4 August 2021.

World Trade Organizationi (WTO) (2014a). DS412: Canada – Certain measures affecting the renewable energy generation sector. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm.

_____ (2014b). DS426: Canada – Measures Relating to the Feed-in Tariff Program. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm.

_____ (2015). Environmental Goods Agreement (EGA). Available at https://www.wto.org/english/tratop_e/envir_e/ega_e.htm.

_____ (2017). China – Subsidies to producers of primary aluminium. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds519_e.htm.

_____ (2018). DS456: India – Certain Measures Relating to Solar Cells and Solar Modules. Availabel at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm.

_____ (2019). DS510: United States – Certain measures relating to the renewable energy sector. Available at https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds510_e.htm.

_____ (2021). WTO Dispute Settlement: One-page case summaries 1995–2020. Available at https://www.wto.org/english/res_e/booksp_e/dispu_settl_1995_2020_e.pdf.

_____ (n.d.). Activities of the WTO and the challenge of climate change. Available at https://www.wto.org/english/tratop_e/envir_e/climate_challenge_e.htm.

Yang, Mui (2021). China's aluminium production surged by 5% in 2020, producing more emissions than Indonesia. EMBER, 7 May. Available at https://ember-climate.org/commentary/2021/02/07/china-aluminium-2020-emissions/.

CHAPTER

Climate-smart business and investment

The previous chapter evaluated the degree to which trade and investment in Asia and the Pacific were aligned with climate action. This discussion is continued in this chapter with a focus on the role of business, finance and investment in climate action. It also includes a discussion on possible government action to support and encourage their roles in addressing climate change.

"As the region accounts for nearly three quarters of global emissions in manufacturing and construction, it needs to address emissions from the side of renewable energy sources, and through reducing emissions from manufacturing and construction."

While nearly half of the CO2 emissions come from the generation of electricity and heat, 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 the region. Reflecting its central role in global value chains, the region accounts for nearly three quarters of global emissions in manufacturing and construction. This points to the need to address the region's emissions from the side of renewable energy sources, and by reducing CO2 emissions from manufacturing and construction sectors.

"The required transformation will lead to a structural change in which jobs in "old" industries are replaced by those in new sectors."

To recover from the COVID-19 crisis, countries need to dramatically step up their efforts and invest in decarbonizing their economies (UNEP, 2020). While a growing number of economies in the region have pledged to reach carbon neutrality by 2050,[1] these pledges also need to be underpinned by near-term policies and measures to drive the transformation. The transformation required will lead to a structural change in which jobs in "old" industries are replaced by those in new sectors, requiring policies to facilitate the transition while cushioning the impact on vulnerable groups to ensure a just transition. IEA (2021) estimates that the transformation will involve a surge in clean energy investments of $5 trillion annually by 2030, a boom that, in turn, is expected to create 16 million new jobs in clean energy, energy efficiency, engineering, manufacturing and construction industries, and, as a result, more than compensate for the five million jobs lost resulting from downscaling industries as part of this transition (IEA, 2021).

"A host of policies, tools, and mechanisms – both voluntary and regulatory – are needed to drive the required change, as no single policy will be enough to stimulate change at the scale and speed required."

A host of policies, tools, and mechanisms – both voluntary and regulatory – are needed to drive the required change, as no single policy will be enough to stimulate change at the scale and speed required. While government policy is critical to drive the change, early corporate action is also very important. Encouragingly, a small but growing number of companies in the region are already scaling up their climate action, with the most ambitious setting emission reduction goals needed to achieve the goals of the Paris Agreement.

This chapter provides an overview of the changes required to decarbonize economies and the key policies needed to support that transformation, followed by a discussion on the importance of business leadership and action, and of the role of financial sector actors in helping to drive the required change. Section A highlights key sectors that need to be decarbonized to realize climate goals, and accordingly the areas that require both large investments and changes in the kind of products or materials produced for or used within those sectors. Section B discusses key government policies that can help steer local and domestic private sector in that direction. Section C highlights the important role of corporate leadership, with examples of what companies can do to prepare for a future with stronger climate policies by adopting internal goals and policies to drive climate considerations in investment decisions. Sector D addresses the critical role of financial sector actors in catalysing the required change through how it allocates capital and section E concludes.

A. PRIORITY SECTORS FOR CLIMATE-SMART BUSINESS AND INVESTMENT

This section provides a brief overview of key changes needed to decarbonize four key priority sectors: energy; industry; transport; and buildings and construction. In most Asia-Pacific economies, these sectors rely heavily on international transfer of goods, services, finance and technology. Extensive investments are needed to transform these sectors and reduce emissions.

1. Energy sector

As noted in ESCAP (2021a) and earlier in this report, limiting the global temperature rise largely hinges on decarbonizing the energy system, which requires shifting the energy supply towards renewables and low-carbon resources, integrating energy efficient technologies and standards across economic sectors and the built environment, and transitioning to zero emissions vehicles and transportation systems (ESCAP, 2021a). IEA (2021), in its flagship report Net-Zero by 2050: A Roadmap for the Global Energy Sector, advocates that by 2050 the use of existing unabated coal power must decline by 90 per cent to just 1 per cent of total energy use globally; fossil fuel demand must decline by 55 per cent; and oil use

[1] Over the past year in the Asia-Pacific region Bhutan, Fiji, Japan, Maldives, Marshall Islands, Nepal, New Zealand and the Republic of Korea pledged to be carbon neutral by 2050 and China pledged to be carbon neutral by 2060. Other countries in the region have yet to make a similar pledge.

must decline by 75 per cent. In addition, almost 90 per cent of electricity supply needs to come from renewable resources, with wind and solar PV accounting for nearly 70 per cent of it and most of the remainder coming from a nuclear source. The IEA road map also highlights the critical role of energy efficiency, renewable energy, electrification of everything, electric vehicles and reduced methane emissions (IEA, 2021).

> *"Asia-Pacific countries need to decarbonize power generation, including increasing the share of renewables by a factor of six to amount to 60 per cent of the total energy mix by 2050."*

However, as noted in chapter 2, in spite of strong growth in the renewable energy sector, such as wind and solar, the Asia-Pacific region continues to rely heavily on fossil fuels for its power generation, in particular on coal, a key factor behind the region's large share of global GHG emission (ESCAP, 2021a). In stark contrast to the targets of the Paris Agreement, which require a global phase-out of unabated coal by 2040 and the achievement of peak coal-fired power generation by 2020, emissions from coal-fired power generation in the region are projected to continue to remain very high until after 2040, and only be phased out by around 2060, (ESCAP, 2021b). Asia-Pacific countries, therefore, should embark on a path towards decarbonization of power generation, including increasing the share of renewables by a factor of six to raise its share of the total energy mix to 60 per cent by 2050 (Lee, 2020). Globally, the shift to green energy has begun. In 2020, greenfield FDI into renewable energy for the first time outpaced investments in fossil fuels, totalling $87.2 billion in 2020, down only 10 per cent from the record high reached in 2019. Meanwhile, FDI flows to the coal, oil and gas sectors plummeted by 61.2 per cent to $44.8 billion, the lowest amount directed to fossil fuels since the start of fDi markets data in 2003 (fDi Markets, 2021).

2. Industrial sector

A large part of industry-related emissions come from a limited number of energy-intensive industrial sectors that produce basic materials, including, cement, aluminium, iron and steel, pulp and paper and chemical and petrochemical sectors, which together account for approximately 22 per cent of global CO2 emissions (Ahman, 2019). With demand for such materials continuing to grow as the world develops, a key challenge is to deploy innovative solutions for increasing energy efficiency and reducing resource-use in energy-intensive industrial sectors, to bring them in line with the Paris Agreement goals. Prompted by growing pressure, innovative solutions are starting to appear for reducing emission in these sectors.

> *"A large part of industry-related emissions come from a limited number of energy-intensive industrial sectors, including cement, and iron and steel. With demand for such materials continuing to grow as the world develops, a key challenge is to develop innovative solutions for increasing energy efficiency and reducing resource-use in such sectors."*

For example, the global iron and steel industry and the cement industries each account for approximately 8 per cent of CO2 emissions because of their reliance on coal, and gases released when cooking ground limestone with sand and clay to make cement. As a result of population growth and rapid urbanization, the number of buildings worldwide is expected to double by 2060, which, in turn, will substantially increase the amount of cement and steel consumed (Chandler, 2019). However, by replacing coal with renewable energy, or hydrogen generated with renewable energy, identifying ways to use less heat and input materials, and applying methods for carbon capture and utilization, the sector's carbon footprints can decline dramatically (box 3.1).

3. Transport sector

Global transport is a key sector spurring the growing energy demand and the fastest growing source of CO2 emission, emitting approximately 25 per cent of global CO2 emissions from fuel combustion in 2018. From those emissions, 45 per cent came from passenger vehicles, 29 per cent from road freight vehicles, 12 per cent from aviation, 11 per cent from international shipping and less than 1 per cent from rail (Naimoli, and Tsafos, 2020). The sector remains dependent on fossil fuels, and between 2000 and 2016, emissions from transport activities increased by 92 per cent (ESCAP, 2019). Transport is important as an enabler of other sectors, and as a sector in its own right.

Box 3.1

Low-carbon cement and steel coming to market

The global iron and steel industry and the cement industry each contribute approximately 8 per cent of CO2 emissions due to their reliance on of coal, and the gases released when cooking ground limestone with sand and clay to make cement. However, decarbonization of the production processes in the sectors is possible by replacing coal with renewable energy, or hydrogen generated with renewable energy, and by applying methods for carbon capture and use.

With demand for fossil-free steel growing from sectors, such as automotive, commercial vehicles, white goods and furniture, related technology is being tested. For example, three Swedish companies launched a pilot plant in 2018 aiming to bring fossil-free-steel to the market by 2026 (SSAB, n.d.). As another example, a new company is planning to set up a large-scale steel plant to produce fossil-fuel free steel using a new process. Aiming to start production in 2024, it estimates that emissions per tonne of steel produced can be reduced by as much as 95 per cent (Scania, 2021).

Another example is ArcelorMittal, which, in addition to involvement in a hydrogen-fueled steel project H2 based in Hamburg, Germany, plans to build an industrial-scale plant to capture and convert carbon emissions from the blast furnace to bioethanol, and to capture waste CO2 and hydrogen from the steelmaking process and convert it to synthetic gas, which will replace the use of fossil fuels in iron making (Arcelor Mittal, n.d.).

The transition from coal to green hydrogen is expected to initially increase costs by one third, and then result in a decline in costs as the technology matures (European Parliament, 2020). It is also expected to have implications on the geographical distribution of the global steel industry, as local availability of cheap renewable energy and transport infrastructure will become key industry competitive aspects. This highlights the importance of government-private sector collaboration for advancing the decarbonization in areas related to hydrogen and hard-to-abate sectors, which require substantial infrastructure development and investments.

In the Asia-Pacific region, with China manufacturing half the world's steel, an important development is the country's new draft action plan for "carbon peak and reduction in the iron and steel industry", which targets peak emissions by 2025 and a 30 per cent cut in emissions by 2030 (Buckely, 2021).

In the cement industry, Carbon Cure, a Canadian-based technology company, has developed a technology that injects captured CO2 into concrete as it is mixed, permanently embedding the gas into the end product. Reportedly, the mineral itself improves the combustion strength of the concrete, enabling cement producers to use less cement in their mixture while achieving the same strength of the concrete, resulting in lower CO2 emissions as a result of the reduced use of cement. (CarbonCure, n.d.; CNN, 2018).

Another technology is CO2 absorbed concrete, developed by Kajima Corporation, the Chogoku Electric Power Company and Denka Company and Landes Corporation, and supported by Mitsubishi. By using special admixtures and adopting special CO2 curing methods, the amount of cement needed is lower and the absorption of CO2 inside the concrete is more rapid. Moreover, by using industrial by-products, such as coal ash and blast furnace slag, the resulting pre-cast concrete products can reportedly even become carbon negative (ChallengeZero, n.d.).

Cross-industry collaboration initiatives are being launched to advance progress in decarbonizing the industry in which such technologies will be important. In September 2020, a group of 40 global cement companies came together through the "2050 Climate Ambition" to commit to deliver carbon-neutral cement by 2050. And in July 2021 the Global Cement and Concrete Association (GCCA) and the World Economic Forum (WEF) jointly launched the a Concrete Action for Climate initiative, which aims to develop a net-zero road map for the industry and create a global market for carbon-neutral concrete by 2050 (Edie, 2021).

"Global transport is a key sector spurring the growing energy demand and the fastest growing source of CO2 emission, emitting approximately 25 per cent of global CO2 emissionsfrom fuel combustion."

To decarbonize the sector, a systems approach must be taken, which would entail integrating low-carbon transport into urban development plans, expanding public transport, stimulating a switch from combustion engines to electric vehicles and other alternative fuels, including building supporting charging and fueling infrastructure, and promoting active mobility. This effort involves electrifying much of personal transportation – the IEA Net Zero by 2050 road map assesses that the sale of electric vehicles would increase from approximately 5 per cent of global car sales to more than 60 per cent by 2030. However, while the need to electrify personal transporation is clear, developing solutions for decarbonizing commercial transport vehicles remains a challenge.

4. Construction sector

Commercial and residential buildings account for approximately 25 per cent of CO2 emissions in the region, when taking into account the emissions of the energy needed to heat and cool them, according to IEA data. Increasing energy efficiency and deploying low-carbon energy efficient solutions for heating and cooling will, therefore, be key in strategies to decarbonize the region. Retrofitting existing buildings to make them more energy efficient is critical in this regard, including, by improving the building envelop and optimizing heating, cooling, lighting, and ventilation services (ScienceDaily, 2019).

"Commercial and residential buildings account for approximately 25 per cent of CO2 emissions in the region. Greening buildings by increasing energy efficiency and deploying low-carbon energy efficient solutions for heating and cooling is essential in strategies to decarbonize the region."

As the Asia-Pacific region becomes more developed and urbanization increases, many buildings will be constructed. Designing and constructing buildings in the most energy efficient way is critical to reduce emissions from the sector. Conventional cooling already comprises up to 7 per cent of global GHG emissions. Population growth, urbanization, rising income levels, and a heating planet will lead to further

Box 3.2

The role of building standards and certification schemes

A problem in the building sector is that builders and developers have an incentive to cut costs to keep prices or rents low, while buyers – although interested in lower energy consumption – cannot be certain of the potential savings from more energy efficient buildings, and accordingly, are not willing to pay a premium for buildings with higher energy efficiency. Voluntary certification schemes have been proposed as a result to guide green construction and enabling to distinguish more energy efficient buildings. Examples of such schemes are the LEED rating system, run by the U.S. Green Building Council, and the Green Mark Certification Scheme, launched by the Government of Singapore in 2005.

Such schemes enable tenants to better assess the energy efficiency of a building, and builders and developers to charge a premium for more sustainable buildings. For example, a platinum rating under the Green Mark Certification Scheme indicates that energy savings of 30 per cent can be achieved compared to a traditional building. Such certifications can also help increase rental income, for example in Hong Kong, China, office buildings with the highest green credentials get a 37 per cent premium in rent compared with non-green rated buildings (James and Kwan, 2021).

However, because of the many different codes and schemes, green certification is inconsistent. Reducing emissions from buildings on a larger scale may thus require a combination of efforts, ranging from strengthening the "greening" aspects of national building codes and harmonizing certification codes and schemes, to incentivizing retrofitting, and introducing mandatory information of the energy efficiency of buildings.

rises in such emissions.[2] For new buildings, in addition to switching to low-carbon production methods for cement and steel, it is necessary to carefully consider material choice and circular thinking to reduce the materials footprint of buildings, including by using materials that emit less CO2 during production, and increasing the recycling of old building materials into new buildings. In addition to trade and investment policies enabling access to innovative construction materials and related services, strengthening building codes, harmonizing voluntary certification schemes, and introducing mandatory information of the energy efficiency of buildings are useful in accelerating progress (see box 3.2).

B. ADVANCING CLIMATE-SMART BUSINESS AND INVESTMENT – THE CRITICAL ROLE OF POLICY

A host of government policies need to be implemented to transition economies to a lower emission pathway. This section provides a short overview of key policies that can help drive decarbonization of economies and business and investment decisions.

"Setting national commitments to transition to a net-zero carbon economy is an important start. National plans need to incorporate sectoral-level policies and in particular targeting emission-intensive sectors."

Setting national commitments to transition to a net-zero carbon economy is an important start. As national governments play key roles in determining the pathways towards the planned emissions reduction, countries should establish emission limits and create detailed, implementable national road maps to decarbonization that include midterm goals to provide a strong and consistent signal to businesses (Asian Development Bank Institute, 2013). Policies should be adopted to promote energy efficiency, emission reductions and diversification of a country's energy mix including through tools, such as feed-in tariffs and renewable portfolio.[3] Governments should also strive to set up economy-wide carbon pricing and remove fossil fuel subsidies to internalize the external cost of emissions in company calculations, which will stimulate climate action by business and help to mobilize financial investments in clean technology and market innovation, as further discussed in chapter 6.

"Governments should also strive to set economy-wide carbon pricing to internalize the external cost of emissions in company calculations, which encourage the setting of climate-smart business decisions."

National plans also need to incorporate sectoral-level policies, in particular targeting the emission intensive sectors, including the four highlighted in the previous section. For example, to reduce emissions in the transportation sector, Governments could introduce new performance-based targets and incentive systems. This can include tax exemptions for low-carbon vehicles, fuel efficiency and pollution standards, and – as electric vehicles are three times as energy efficient as conventional internal combustion engine vehicles – establishing timeframes for halting the sale of new cars running on internal combustion engines, as what was recently done in the United Kingdom (Ambrose, 2020). Adopting an urban development perspective can further help decarbonizing transport through coordinated policies for land-use planning and climate-smart infrastructure.

"To leverage FDI, Governments can encourage their foreign investment promotion agencies to attract investment in low-carbon projects."

Governments could also leverage FDI by encouraging their foreign investment promotion agencies to attract investment in low-carbon projects. This can be done by targeting investments in such sectors as renewable energy, energy efficiency solutions and electric vehicles, by tailoring incentives to promote such industries, namely focusing on the quality instead of the quantity of investments (see box 3.3). Governments may also

[2] For example, room air conditioners alone are predicted to increase from 1.2 billion globally today, to 4.5 billion by 2050, which could add approximately 132 GT of CO2e emissions cumulatively between now and 2050, resulting in over 0.5°C of global warming by the end of the century (Climate Champions, 2021).

[3] Feed-in tariffs support the development of renewable energy sources by providing a guaranteed, above-market price for producers, while renewable portfolio standards mandate a specified percentage of the electricity sold by utilities to come from renewable resources.

use risk-mitigating products, such as political risk guarantees, credit risk guarantees and carbon and pollution fees, to encourage private sector investment in low-carbon infrastructure development or related local decarbonization projects. Governments should also review their investment agreements to include sustainable development clauses, and ensure that they are framed in a way that supports climate action and does not create an obstacle towards future government policy in relation to climate change.

Box 3.3

Assessing and attracting sustainable FDI

Foreign Direct Investment has the potential to contribute to transferring technology and expertise for climate-smart growth and development. However, achieving long-term sustainable growth is not necessarily the primary concern for profit-seeking investors and may not receive sufficient attention by policymakers seeking to attract more investment. To help host countries screen for more sustainable and climate-smart investments, and calibrate private and public incentives accordingly, sustainability indicators could be useful.

Identifying and applying a set of FDI sustainability indicators enables the host country to assess the impact of FDI projects on the economic, social and environmental dimensions of sustainable development, permitting a more direct comparison between different factors regarding an FDI project's costs and benefits for a host country. This, in turn, would allow countries to make informed decisions and identify policies to maximize the positive impacts and to avoid or minimize potential negative impacts.

Organizations, policymakers and academia have been attempting to formulate frameworks to help policymakers differentiate across types of FDI and their various socioeconomic impacts. For example, the United Nations Conference on Trade and Development (UNCTAD) launched its Investment Policy Framework for Sustainable Development in 2015, which outlines guidelines for national investment policies and provides an action menu for the promotion of investment in sectors related to the SDGs. OECD has also developed a policy framework for investment, along with FDI qualities indicators, which are intended to help policymakers assess how FDI supports national policy objectives, where challenges lie, and in which areas intervention is needed. In a more recent study conducted for ESCAP, Ali Dabkhah developed comprehensive general and sector-based sustainability indicators for assessing the contribution of FDI to the achievement of SDGs in host countries. The goal is to apply this tool to FDI projects of the host country to quantify their long-term impacts and improve their FDI policy climate. The indicators measure the impact on the host country and not the sustainability of the investor.

While the indicators used in these frameworks cover a broad range of social and environmental sustainability dimensions, a few relate to climate mitigation, which is mainly focused on GHG emissions, and clean and efficient energy usage. For example, UNCTAD has proposed indicators that measure GHG emissions, carbon offset/credits, carbon credit revenues and energy consumption/efficiency, while five "FDI qualities" identified by OECD includes indicators related to carbon emissions/carbon footprint in industry, energy efficiency and renewable energy vs. fossil fuels. Meanwhile, the study conducted by Ali Dabkhah proposes to use indicators related to CO2 emissions, renewable energy use, resource management and pollution control, in addition to potential sector-based sustainability indicators. Using such indicators can help countries screen for more climate-smart FDI and calibrate investment incentives to reflect their climate impacts, while also helping to improve transparency and reduce uncertainty related to climate impacts of FDI.

Sources: Investment Policy Framework for Sustainable Development UNCTAD (2015); FDI Qualities Indicators: Measuring the sustainable development impacts of investment OECD (2019); and Developing Comprehensive General and Sector-Based Indicators for Assessing the Contribution of FDI to Sustainable Development ESCAP (forthcoming).

"Governments may also consider directly investing or providing financial incentives for projects that reduce the cost of existing low-carbon technologies."

In addition, Governments may also consider directly investing or providing financial incentives for projects that reduce the cost of existing low-carbon technologies, such as solar, wind, biomass and hydro energy, and for research and development in new technologies that improve energy efficiency. To help small and medium enterprises transition, Governments may develop a focused and well-packaged regulatory system that integrates efficiency standards and targets by assisting with compliance mechanisms, including through providing funds and matching grants.

As noted in chapter 2, carbon and energy efficiency standards, and labelling provide key levers that can help drive decarbonization. Product and performance standards can drive change in a host of sectors, from energy efficiency of home appliances to other machinery, and buildings. However, to reduce obstacles for trade and mitigate compliance costs, in particular for small and medium-sized enterprises, standards should ideally be harmonized at regional or international levels. Moreover, by adopting sustainable procurement policies, Governments, as the largest procurer of goods and services, can drive further decarbonization.

National plans related to the implementation of nationally determined contributions, including sustainable development plans and national policies and action plans for sustainable consumption and production, can help bring different policy streams together to support decarbonization, including carbon pricing instruments, standards and labelling, public procurement, research and development and innovation policies and support systems, and other policies and programmers.

"Regional collaboration on renewable energy connectivity and trade could be effective."

Finally, across Asia and the Pacific, regional-level actions and coordination could further enhance the efficiency of the above-mentioned policies, including through attracting sustainable FDI (see box 3.3). For example, a regional carbon market could promote the linkage of regional carbon trading schemes and encourage investment in cross-border low-carbon energy infrastructure and transport projects. Regional collaboration on renewable energy connectivity and trade could also be effective. Countries can work together to set applicable regional or subregional renewable energy targets and efficiency standards, establish a network of regional low-carbon innovation centres, and forge a free-trade agreement within the region for high-impact green and low-carbon technologies and services (Asian Development Bank Institute and ADB, 2013).

C. RESPONSIBLE BUSINESS – THE NEED FOR CORPORATE LEADERSHIP AND ACTION

While policy changes are essential to change investment and business behaviours, considering the potential new market opportunities to address climate change and the risk of inaction, a growing number of companies have become proactive in reducing emissions, as part of their social and environmental responsibility, and to stay ahead of the curve in a rapidly changing market.

"The number of companies issuing sustainability reports have dramatically increased, with many of them also measuring and accounting for GHG emissions as part of their reporting."

Guided by international standards and frameworks for responsible business conduct, such as the United Nations Global Compact, the OECD Guidelines, ISO 26000 and related standards at global, national, and sectoral levels, companies have for many years been integrating sustainability into their management systems. While such frameworks have been in existence for a couple of decades, their uptake in the region has risen significantly over the past few years. For example, the number of companies issuing sustainability reports have dramatically increased, with many them also measuring and accounting for GHG emissions as part of their reporting. Efforts to reduce energy consumption in business have also become more frequent, as companies realize the strong business case for and short pay back from many energy-efficiency investments. To help drive internal change and adapt to a future that likely

includes a carbon price, some companies have also adopted an internal price on carbon, helping them to start the process of adapting their business models and investments to a low-carbon world. In addition, over the past few years, a growing number of companies have committed publicly to achieve net-zero emissions by 2050, with the most ambitious setting emission reduction targets that are aligned with what scientists say is needed to limit global warming to 1.5 degrees.

"Some companies have adopted an internal price on carbon, helping them to start the process of adapting their business models and investments to a low-carbon world."

The following section provides an overview of the progress with regard to sustainability reporting and disclosure frameworks, internal carbon pricing, and GHG emissions commitment and target setting.

1. Sustainability reporting and emissions disclosure

The underlying rationale of sustainability reporting is that what you can measure you can manage, and that through increased transparency, investors and consumers can reward companies with good performance. Disclosure can also provide assistance in the following areas: reputation management; identification of risks and opportunities; benchmarking performance; and preparing for possible future mandatory reporting rules.

As markets are demanding more sustainability information, over the past decade, the number of companies reporting and accounting for sustainability impacts increased dramatically. In 2019, 90 per cent of the companies in the S&P 500 index published corporate sustainability reports, up from 20 per cent in 2011. According to the KPMG Survey of Sustainability Reporting 2020, 80 per cent of the 5,200 reviewed companies in 52 countries and jurisdictions report on sustainability, including the top 100 companies in Japan (KPMG, 2020). Not only the volume but also the quality of reporting has increased over time, as companies gain experience and new frameworks emerge to harmonize reporting and ensure accountability (Government and Accountability Institute, 2020).

"Many large companies have set targets to reduce their carbon emissions, and more and more of them are linking their targets to the global climate goals."

A majority of companies reviewed in the KPMG survey have set targets to reduce their carbon emissions, and more and more of them are linking their targets to the global climate goals. On the financial risk side, 40 per cent of reporting companies acknowledge financial risk related to climate change in their reporting and 20 per cent report climate risk in line with the Task Force on Climate-related financial disclosures recommendations.

"The upsurge in reporting is partly driven by increased requirements by stock exchanges for listed companies to produce sustainability reports."

Within the region, reporting has increased substantially in India, Japan, Malaysia, Pakistan, Sri Lanka, and Taiwan Province of China. The upsurge is partly driven by increased requirements by stock exchanges for listed companies to produce sustainability reports. This is in line with the high number of stock exchanges joining the United Nations-led Sustainable Stock Exchanges initiative. For example, within the Association for Southeast Asian Nations (ASEAN) region, six countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Viet Nam) require some form of environment, social and governance (ESG) disclosure or issue guidelines on sustainability reporting from listed companies. Mandatory reporting for listed companies became effective in 2020 in Indonesia and in 2016 in Viet Nam, while for the Philippines and Singapore, it is based on a "comply or explain" basis since 2019 and 2016, respectively. In addition, since 2017, the Securities and Exchange Commission of Thailand requires company boards to ensure sustainability reporting using a framework that is proportionate to the company's size and complexity and meets domestic and international standards (Pan, 2021). Accordingly, as noted by KMPG, "sustainability reporting is now becoming so near universally adopted that the minority of large companies not yet reporting will find themselves seriously out of step with global norms".

Among the different reporting and disclosure frameworks, GRI is the most commonly used, adopted by more than 10,000 companies and organizations in more than 100 countries.[4] Other key disclosure frameworks are CDP, the Climate Disclosure Standards Board (CDSB), the International Integrated Reporting Council Integrated Reporting framework, the Sustainability Accounting Standards and the Task Force on Climate-related Financial Disclosures (TCFD) (table 3.1).

Carbon emissions are generally accounted for in line with the standards established by the GHG Protocol, which divides emissions into three categories: Scope 1 concerns emissions in own operations; Scope 2 relates to emissions from purchased or obtained electricity, steam, heat and cooling; and Scope 3 accounts for emissions in the value chain.

While the different standards and reporting frameworks serve different purposes, their multitude makes performance difficult to compare. As a result, measurement and reporting are sometimes ends in themselves rather than means to improve environmental or social outcomes. Moreover, unlike financial reporting, a minority of sustainability reports

Overview of disclosure frameworks

Standard/framework	Description
GHG Protocol	Supplies the most widely used GHG accounting standards, used in most other disclosure frameworks, such as CDP.
GRI standards	Enable companies to report sustainability information that describes their significant impacts on the economy, environment, or people, and hence their contributions – positive or negative – towards sustainable development.
Climate Disclosure Standards Board (CDSB)	An international consortium of nine business and environmental non-governmental organizations launched to develop a global mainstream corporate reporting model to equate climate change and natural capital information with information about financial capital. The scope has since been expanded to cover environmental and natural capital information.
Sustainability Accounting Standards Board (SASB)	SASB develops and maintains sustainability accounting standards – for 79 industries in 11 sectors – that help public corporations disclose material information to investors.
International Integrated Reporting Council (IIRC) Integrated Reporting (IR) framework	The Integrated Reporting (IR) Framework of the IIRC promotes the concept that integrated reporting is based on integrated thinking, explicitly connecting an organization's strategy, governance, performance and prospects.
Taskforce on Climate Related Disclosures (TCFD)	TFCD developed a reporting framework for providing transparency about companies' climate-related risk exposures to investors, lenders and insurance underwriters. The objective is to enable investors, lenders and insurers to have a better picture of which companies will thrive as environmental regulations evolve, consumer behaviour shifts and new technologies emerge in response to climate change.
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. CDP also scores companies on their disclosed ability to mitigate and adapt climate change, and runs supply chain programme to help gather/assess environmental and climate performance of suppliers.

Source: Statement of Intent to Work Together Towards Comprehensive Corporate Reporting, Summary of alignment discussions among leading sustainability and integrated reporting organizations CDP, CDSB, GRI, IIRC and SASB (n.d.), and World Federation of Exchanges and Sustainable Stock Exchanges Initiative (2019).

[4] GRI standards are structured as a set of interrelated modular standards. As part of the GRI set of standards, GRI 305 addresses emissions into air, based on the GHG Protocol Corporate Accounting and Reporting Standard (https://www.globalreporting.org/standards).

are validated by third parties (Pucker, 2021). With supply chains becoming increasingly multi-tiered, fully accounting for impacts several steps down the supply chain presents a challenge. Difficulty in comparing information, in turn, makes it hard for investors and consumer groups to assess progress.

"The multitude of sustainability frameworks makes it difficult for investors and consumer groups to assess progress, leading to calls for the harmonization of reporting."

Thus, calls to harmonize reporting are increasing, with some discussions already under way. In Europe, the European Union is working to update its Non-financial Reporting Directive. In April 2021, the European Commission adopted a proposal for a corporate sustainability reporting directive, which envisages the adoption of European Union sustainability reporting standards (European Commission, n.d.a). The five major non-financial reporting organizations (GRI, SASB, IIRC, CDSB and CDP) have also published a statement of intent, committing to work together towards comprehensive corporate reporting (KPMG, 2020). Moreover, following consultations in late 2020, the International Financial Reporting Standards Foundation has proposed to establish a new international sustainability standards board, with the objective to introduce a global baseline of standards for sustainability-related disclosure focused on meeting the information needs of investors globally when assessing enterprise value, beginning by looking at climate (IFRS, 2021). This is significant as it could lead to globally comparable sustainability standards that would provide investors with comparable and actionable information for investment decisions.

2. Internal carbon pricing

"Implementing an internal carbon price by enterprises can serve as a useful tool to help companies reduce corporate emissions and allocate funds for investment in low-carbon technologies."

In the absence of a price on carbon, implementing an internal carbon price by enterprises can serve as a useful tool to help companies reduce corporate emissions and dependency on fossil fuels, increase resource productivity, retain budgets to invest in energy-saving and low-carbon technologies, incorporate carbon costs into procurement and investment decisions and prepare for carbon taxes or other carbon regulatory policies (Carbon Footprint, n.d.).

A variety of approaches can be used for assigning value to carbon emissions, such as shadow pricing, implicit carbon price, internal fee or a hybrid of these. Shadow pricing is the most used approach. It involves attaching a hypothetical cost of carbon to each ton of carbon, which helps in computing the hidden risks and opportunities throughout its operations and supply chains. This information can then be used to support strategic decision-making related to future capital investments. Internal fee mechanisms take carbon pricing a step further by charging responsible business units for their carbon emissions, with the collected revenue often reinvested into clean technologies and other activities that can help transition the company towards lower-carbon operations and investments. Some companies even establish an internal trading mechanism – allowing the business units to trade allocated carbon credits (ESCAP, 2020).

According to recent CDP data, the use of internal carbon pricing rose by 80 per cent over the past five years and in 2020, and more than 2,000 companies disclosed current or planned use of internal carbon pricing to CDP. 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 in the next two years. In the Asia-Pacific region, the largest increase in the use of internal 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, as compared to 661 companies in Europe.

"There is a correlation between the companies putting a price on carbon and those taking other strategic actions to integrate climate change into their business strategy, such as setting science-based targets."

While the use of internal carbon pricing is higher among power and fossil fuel industries, its adoption in manufacturing industries is lagging, with only

29 per cent of manufacturing companies currently pricing or expecting to price carbon in the next two years (CDP, 2021). The average price used was also relatively low, at $25 per metric ton of CO2 equivalents (tCO2e), much lower than the $100 per metric tCO2e called for by the Carbon Pricing Leadership Coalition (CPLC), the International Emissions Trading Association (IETA), the United Nations Global Compact and the World Bank (Carbon Pricing Leadership Coalition, 2019). Internal carbon pricing is five times higher among companies that expect carbon pricing regulations than among those companies that do not anticipate them to be set. CDP data also indicate a clear correlation between the companies putting a price on carbon and those taking other strategic actions to integrate climate change into their business strategy, such as setting science-based targets.

3. Net-zero commitments and target setting

"Committing to emission reduction targets aligned with trajectories required to reach the goals of the Paris Agreement can help companies advance climate action and maintain such efforts during challenging time."

Over the past few years, a host of global campaigns and initiatives have been initiated to rally company action on climate (table 3.2). At the most ambitious level, are initiatives that 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. Such initiatives can help companies advance climate action through the transparency, screening and support provided. Through the public nature of the commitments, they can also help maintain ambitious action when faced with challenges.

Among these, the Science-based Targets Initiative has quickly expanded to become one of the more important initiatives in driving corporate climate mitigation. The initiative invites companies to set emission reduction targets aligned with what is viewed as being required to achieve a 1.5 degree or well below 2-degrees 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 more than $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 them set their targets in line with a 1.5°C trajectory. More than 300 signatories are from Asia and the Pacific, with most being from Japan and India. Of the Asian signatories, 69 have set targets at 1.5°C . SBTi has found that companies that set science-based targets had reduced their combined emissions by 25 per cent since 2015, as compared to an average increase of 3.4 per cent in global emissions from energy and industrial processes (Science Based Targets, 2021).

Another interesting initiative is Climate Action 100+, a global investor coalition comprised of more than 615 investors with $54 trillion in assets under management. It aims to leverage the power of global investors to ensure that the largest global GHG emitting corporates take necessary action on climate change. To this end, 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 investor 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.

The vast number of initiatives and campaigns is a sign of the strong urge to advance business action on climate, but it also risks creating confusion. On a positive note, the different initiatives also work to reinforce each other, as there are strong links between the initiatives and the criteria applied (table 3.2).[5]

[5] For example, by signing up to the Business Ambition for 1.5°C, a company joins the Race to Zero campaign and commits to emission reduction targets in line with the criteria and recommendations of the Science Based Targets initiative.

Table 3.2 **Summary of key initiatives**

Initiative	Led by	Focus
Race to Zero	UNFCCC, Climate Pledge, B Corp Climate Collective, and the Exponential Roadmap initiative	Campaign that mobilizes a coalition of leading net-zero initiatives jointly representing 24 regions, 708 cities, 2,360 companies, 624 universities, and 163 investors, and comprised of more than 15 per cent of the global economy
Business Ambition for 1.5 degrees	UN Global Compact, Science Based Target initiative (SBTi), CDP and the We Mean Business coalition	Campaign inviting corporate leaders to commit their companies to a 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 take action on climate change
Science-Based Targets initiative	CDP, UN Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF)	Invites companies to commit to set targets for emissions reductions aligned based indication from scientific information on what is required to achieve a 1.5 degree or well below 2-degrees trajectory. The trajectory required to achieve the goal set under the Paris Agreement.
Climate Neutral Now	UNFCCC	Invites organizations, governments, and citizens to commit to climate neutrality. Recently revamped to categorize participants into bronze, silver, gold status.
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 (minimum 60 per cent by 2030 and 90 per cent by 2040). EP100 members commit to double their energy productivity, or achieve net-zero carbon buildings, and EV100 required members to switch their fleets to electric vehicles by 2030.
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 leverage the influence of signatory investors to improve the climate performance of large emitters by working with 167 key enterprises to put in place strong corporate emissions reduction strategies.

"More Asia-Pacific companies need to be encouraged to set climate-related targets and manage climate impacts in their value chains."

So, what has been the progress and impact to date? A recent report by the Energy and Climate Intelligence Unit (ECIU) and Oxford Net Zero indicates that while more than one fifth (21 per cent) of the world's largest 2,000 public companies have set net-zero targets, many of the largest emitters lack clear strategies and robust short- and medium-term targets, which are vital to reaching net-zero. (Black and others, 2021). Moreover, based on the Climate Action 100+ Net-zero Company benchmark, no company fully discloses how it will achieve its net-zero targets by 2050. And importantly, while 83 of the world's largest emitters have a net-zero commitment, emissions in the value chain are mentioned in less than half of the targets, although for some it is where a large part of emissions come from. Accordingly, while progress has been made among companies in certain countries or sectors, more Asia-Pacific companies need to be encouraged to set climate-related targets and manage climate impacts

in their value chains. And as uptake increases, policymakers have an important role to play, as they can turn progressive action by companies to cut their carbon footprint into guidelines or mandatory requirements, which would reward early adopters, level the playing field and increase impact (Piper and Wacket, 2021),

D. SUSTAINABLE FINANCE AS A DRIVER OF SUSTAINABILITY

Decarbonizing energy, manufacturing, building and transport sectors will require huge investments. For example, IEA estimates that its Net-Zero roadmap would require that the annual clean energy investment worldwide more than triple by 2030 to approximately $4 trillion. As the world moves towards a net-zero economy, the finance sector needs to play a crucial role in enabling this transformation, by ensuring climate and environmental factors are fully integrated into financial decision-making (United Kingdom, 2019).

"As the world moves towards a net-zero economy, the finance sector needs to play a crucial role in enabling this transformation, by ensuring climate and environmental factors are fully integrated into financial decision-making."

Sustainable investing – an investment approach that considers environmental, social and governance (ESG) factors in portfolio selection and management – has been one of the fastest growing areas of finance following the adoption of the Paris Agreement. Between 2018 and 2020, sustainable investing grew by 15 per cent to reach $35.3 trillion, (Global Sustainable Investment Alliance, 2021). While in 2018 two thirds were in funds that apply negative-screening criteria – the "lightest version", which basically involves excluding certain investments based on ESG criteria – by 2020, most funds were managed through ESG integration, involving systematic inclusion of ESG factors into financial analysis. This shift was particularly pronounced in Japan, where assets managed under sustainable investment strategy increased significantly from $7 billion in 2014 to $2.8 trillion in 2020.

"The financial sector needs to better understand its overall impacts and the risks associated with its financing activities."

Still, according to the recent CDP report entitled "The time to green finance", although financial institutions are increasingly focusing on sustainable finance products, such as sustainability-linked loans, green bonds and sustainable investment funds, the sector needs to understand better its overall impacts and the risks associated with its financing activities. The report notes that only 25 per cent of the 332 financial institutions surveyed disclose on emissions of their overall portfolio emissions, and less than half align their portfolios with well below the 2 degrees pathways (CDP, 2020).

"The net-zero movement is also gaining momentum in the finance sector."

Encouragingly, the net-zero movement is gaining momentum also in the finance sector, with several initiatives launched to drive action. These include the UN-convened Net-Zero Asset Owner Alliance, a collective of some 40 insurers and pension funds with nearly $6 trillion in assets that commit to decarbonize their investment portfolio by 2050 and set interim targets for 2025, 2030 and 2040. The strategy involves actively investing in the transition to decarbonize the economy, leveraging the ownership in companies to advocate and request decarbonization targets from these companies.

On the banking side, the Principles for Responsible Banking provides a framework for ensuring that signatory banks' strategies and practices align with the SDGs and the Paris Agreement. The initiative brings together 230 banks, representing more than one third of the global banking industry. Moreover, in 2021, the industry-led UN-convened Net-Zero Banking Alliance, was launched. The alliance, which is comprised of more than 46 banks from 24 countries that have in total more than $29 trillion in assets, commits its members to align their lending and investment portfolios with net-zero emissions trajectories by 2050. It includes three banks from Asia (UNEP FI, n.d.).

In addition, the Net-Zero Asset Managers Initiative is an international grouping of asset managers committed to investing aligned with net-zero emissions by 2050 and on the insurance side, seven of the world's leading insurers and reinsurers, working together with the UNEP Finance Initiative (UNEP FI), are in the process of establishing the Net-Zero Insurance Alliance. (UNEP FI, 2021).

"Comparable reporting on sustainability is important for investors as they strive to reduce risk and assess what constitutes more sustainable investments."

Comparable reporting on sustainability is important for investors as they strive to reduce risk and to assess what constitutes more sustainable investments. As discussed earlier, over the past few years, there has been greater interest to understand the connection between sustainability topics and financial risk and opportunity. In addition, in November 2020, the Global GHG Accounting and Reporting Standard for the Financial Industry was launched. This new standard is intended to help the financial industry measure and report on financed GHG emissions, building on the GHG Protocol. The standard is expected to spur growth in GHG accounting in the financial industry globally. According to the GHG Protocol, the standard gives financial institutions "access to globally harmonized, robust and transparent methods to consistently measure and disclose financed emissions, a metric that enables them to assess climate-related risks in line with TCFD, set science-based targets using the sectoral decarbonization approach developed by SBTi, report to stakeholders with the CDP disclosure framework, and inform climate strategies and actions to develop innovative products that support the transition toward a net-zero emissions economy" (GHG Protocol, 2021).

1. Policy action

While the finance sector may contribute towards the decarbonization of the companies it engages with, it is important to recognize that finance sector actors operate within the rules set by Governments, and that to achieve rapid progress regulations may need to be adapted. Advancing decarbonization also requires Governments to leverage their role as owners and investors in State-owned companies, banks and pension funds. For example, as argued in a 2020 report by the ESCAP Sustainable Business Network, PBEC and KPMG, as sustainable investing is at an early stage in the Asia-Pacific region, Governments can play an important catalysing role and lead by example by directing the investment bodies under their control to reorient their funds to sustainable investing, thus creating a domino effect (ESBN, KPMG and PBEC, 2020). Governments in the region should also issue guidance on climate-related reporting and implement climate disclosure policies consistent with TCFD, where possible.

"Governments can play an important catalysing role and lead by example by directing investment bodies under their control to reorient their funds to sustainable investing."

Climate risk and ESG disclosure is primarily a voluntary undertaking, but this may change as regulators shift to more prescriptive measures. To some degree, this is already occurring in the region. According to the CFA Institute, markets in Singapore and Hong Kong, China require sustainability reporting on a comply-or-explain basis, whereas in Australia, India, Japan, Thailand and the United Kingdom, such reporting is voluntary (Zembrowsik, Leung and Schact, 2019). Moreover, the Employees Provident Fund of Malaysia recently launched its sustainable investment policy and announced its plans to have a fully ESG-compliant portfolio by 2030 (The Edge 2021).

Regulators in the Asia-Pacific region are also jointly working with their peers globally to achieve climate goals through the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). The purpose of the network is to manage risks and mobilize capital for green and low-carbon investments through the financial system (NGFS, 2019).

Moreover, as regulators move towards mandatory climate disclosures in line with the TCFD framework, financial institutions will probably be among the first entities required to comply. For example, in the United Kingdom "Roadmap towards mandatory climate-related disclosures", banks, insurance companies and the largest pension schemes are required to align their disclosures with TCFD recommendations in 2021, ahead of most listed companies (Scott and Rooke, 2020).

The European Union is also making progress in this regard through the recent adoption of European Union regulations on sustainability-related disclosures in the financial services sector, and the entry into force of the European Union taxonomy regulation, a classification system that establishes a list of environmentally sustainable activities, aiming to help the European Union scale up sustainable investment and implement a European green deal

(European Commission, n.d.a). Together with its recent regulations on the European Union Climate Transition Benchmarks, European Union Paris-Aligned Benchmarks, and sustainability-related disclosures for benchmarks, this shows growing momentum in favour of ESG principles within the European Union (EUR-lex, 2019) (Elias Neocleous, 2020)

In the Asia-Pacific region, the taxonomy landscape is also progressing quickly. Developments in this area in 2021 includes the issuance of a climate change and principle-based taxonomy by Bank Negara Malaysia; a green bond endorsed projects catalogue in China; the establishment of a taskforce to develop taxonomy in Singapore; and the issuance of basic guidelines on climate transition finance by Japan (UNEP FI, 2021). In addition, the Central Bank of the Philippines has issued a sustainable finance framework (Bangko Sentral NG Phiipnas, 2020), and the Monetary Authority of Singapore has launched the Green Finance Action Plan (Monetary Authority Singapore, n.d.).

> *"Over the past few years, an increasing number of Governments and financial institutions in the region have declared their intention to stop funding new coal projects and oil and gas exploration."*

Over the past few years, an increasing number of Governments and financial institutions in the region have declared their intention to stop funding new coal projects and oil and gas exploration (box 3.4). Amid the surging trends in climate litigation, including very recent landmark cases against fossil fuel producers and Governments, the risk of stranded assets is increasing, forcing investors and Governments to reconsider investment strategies (box 3.5).

E. CONCLUSION

As a global powerhouse of manufacturing, nearly three quarters of global emissions in the manufacturing and construction sectors are generated in the Asia-Pacific region. Emissions need to be cut in half by 2030 and reach net zero by 2050 for the world to have a chance to realize the goals of the Paris Agreement. Accordingly, the region needs to play a strong role in decarbonizing its trade and investment. This will require a significant increase in investments in renewable energy and energy efficiency, along with reductions in CO2 emissions from manufacturing processes. While decarbonizing the energy supply is the most important factor for achieving the drastic emission reductions needed, making production processes more energy efficient and input efficient by reinventing heavy industry processes, reducing materials use, and applying circular thinking are also necessary.

Ambitious public policy will be critical to propel this transformation at the scale and speed needed. Companies respond to market signals and thus driving change requires getting those signals right. This should include policies that encourage the following: transforming the energy system and putting a price on carbon that is high enough, and early enough, to spur change across sectors and generate funds to reinvest in decarbonization; removing fossil fuel subsidies and other distorting subsidies; adopting energy efficiency standards and product standards in relevant sectors to advance the transformation; incentivizing retrofitting of buildings; promoting electric vehicles and facilitating charging infrastructure; investing in research and engaging in public-private collaboration to facilitate the infrastructure required for rapid change, such as hydrogen production and charging infrastructure; and putting in place initiatives to drive decarbonization of other sectors.

Given the urgent need for drastic emissions reductions in this decade, companies should not wait for Government policy changes. To prepare for the future, companies, in particular large ones with deep supply chains, should lead the way by showing what can be done, while also advocating ambitious policies. Accounting for GHG emissions and setting emission reduction goals aligned with the pathways required to limit warming to 1.5 degrees are critical in this regard. Companies can also adopt internal carbon pricing, using internal accounting methods to help drive change within their business and generate funding for investment in lower-emission products and processes. All of this has started to take place in the Asia-Pacific region, but it needs to be dramatically scaled up. Policymakers can have an important role to play in this regard by turning action taken by companies to cut their carbon footprint into guidelines or mandatory requirements. By doing this, early adopters are rewarded, a level playing field is created and the impact is greater.

Box 3.4

The coal and fossil fuel divestments movement

The rapidly growing global movement for fossil fuel divestment is encouraging institutions to move their money out of oil, coal and natural gas companies (Carrington, 2018). While the primary argument for this is to meet the targets set in the Paris Agreement, there is also the view that if international targets on climate change are met, these investments will be unprofitable (Howard, 2015). Phasing out coal for power generation is recognized as the single most important step towards achieving the Paris Agreement and protecting the world from the extreme impacts of climate change (Fuentes and Chapman, 2021; James and Kwan, 2021).

In 2018, Ireland became one of the world's first countries to announced plans to sell its investments in fossil fuel companies (Carrington, 2018). At the end of 2020, United Nations members convened Net Zero Asset Owners Alliance – a group of 42 institutional investors with $6.6 trillion under their management – published its position on coal, stating that no further thermal coal power plants should be financed, insured, built, developed or planned (UNEP FI, 2021a). In May 2021, the G7 announced plans to cease international financing of coal projects that emit carbon by the end of the year. It also reaffirmed its commitment to mobilize $100 billion annually to developing countries between 2020 and 2025 (Piper and Wacket, 2021).

In the Asia-Pacific region, China and Japan have been identified as the largest sources of public finance for coal within the Group of 20 countries, extending $9.5 billion and $5.2 billion per year, respectively. Public finance from China, Japan and the Republic of Korea is an important source of funding for coal capacity in the region, with countries in South-East Asia and South Asia being the main recipients of this support (Fuentes and Chapman, 2021).

However, an increasing number of Governments, banks and financial institutions in the region have announced that they are no longer financing new coal-fired powered plants or pulling out of existing projects (Chapman, 2021; Buckley, 2019). For example, in April 2021, the Republic of Korea, the third-largest coal investor in Asia, announced it would not no longer fund new coal projects overseas as part of its plan to achieve carbon neutrality by 2050 (Yas, 2021). In China, State Development and Investment Corporation, became in 2019, the first major domestic financial institution to quit funding coal-related projects (Buckley, 2021), and in September 2021 the Government of China committed to stop funding coal projects abroad. In 2020, the world's leading coal finance company, Mizuho, which is based in Japan, announced plans to stop financing new thermal coal mining projects, after the Japanese Prime Minister, Yoshihide Suga, announced the country's intention to double its target for cutting carbon emissions. Development finance institutions are following suit. In November 2020, the Asian Infrastructure Development Bank announced that it would no longer finance coal-powered plants or projects functionally related to coal (Yi, 2020). The Asian Development Bank (ADB) also issued a draft energy policy in May 2021, indicating that it would no longer finance coal mining or oil and natural gas exploration and production (Kapoors, 2021).

In addition to reducing carbon emissions, positive impacts of the fossil fuel divestment trend include a surge in investment in renewables in Asia and the Pacific. For example, in Viet Nam, there had been a 100-fold increase in solar power production over the past two years, raising its ranking to seventh place in terms of solar capacity globally. This increase can be attributed to the limited funding available for fossil fuels combined with the falling price of solar panels. Also of note, Bangladesh is reconsidering the construction of 26 of the 29 coal-fired plants it was planning to build and the Philippines, in 2020, announced a moratorium on new coal-fired power plants. Going forward, these changes are likely to be followed by others (Uyen, Nguyen, Murtaugh and Bordeau, 2021).

Box 3.5

Human rights and climate – the rise of climate change litigation

Since the signing of the Paris Agreement in 2015, climate litigation has been on the rise, as citizens across the globe strive to hold Governments and companies accountable for their commitments and fight for their fundamental right to live in a healthy environment.

In November 2019, the National Commission on Human Rights of the Philippines claimed that the world's largest fossil fuel firms could be held accountable for violating the rights of its citizens for the damage caused by global warming (Kaminski, 2019). The claim was based on research showing that the lion's share of cumulative global CO2 and methane emissions since the industrial revolution is attributable to the world's largest producers of crude oil, natural gas coal and cement. The Commission stated that these companies – known as carbon majors – have played a clear role in human-induced climate change and therefore should be held legally and morally liable for its impacts. Although current international human rights law does not cover legal responsibility for climate change, it concluded that people affected by climate change and whose human rights have been dramatically impaired deserve access to remedy and access to justice. It also found that in circumstances involving obstruction, deception or fraud, it may be possible to establish criminal intent, making it possible to hold companies accountable not only under civil but also under criminal laws in domestic courts under national laws. In cases in which existing laws are not adequate, the Commission recommended that Governments are obligated to adopt legal reforms to ensure access to justice for affected communities.

In another groundbreaking case, on 27 May 2021, a Dutch court, in a ruling that could have far-reaching consequences for the fossil fuel industry, held Shell, an oil major, partially responsible for climate change and required the company to cut its overall CO2 emissions (scope 1, 2 and 3) by 45 per cent by 2030 compared with 2019 levels, faster than what it had planned. Following the court case, and a shareholder resolution at Exxon in the same week, credit rating agency Moody's noted that "The increasing potential for ever more stringent investor climate- and emissions-related investment thresholds are likely to lead to higher capital costs and diminished access to capital for oil companies that do not keep pace with investors' expectations for transitioning to a low carbon business model" (Reuters, 2021) .

Litigation on human rights grounds has also been used to put pressure on government ambition. In 2015, a group of young people in the Netherlands led the way for a suit filed by more than 900 Dutch citizens against their Government for inaction on climate change and won. The judges rejected the Government's claim that a near-term climate action was too expensive and ordered that it require that CO2 emissions be cut by 25 per cent by the following year (Nelson, 2015). As another example, in May 2021, the highest court in Germany ruled that the Government's climate law was incompatible with fundamental rights, forcing it to revise and reform economic policies and climate strategies for the next three decades. A week later, the Government announced a commitment to accelerate the transition to net-zero gas emissions by 2045 and cut emissions by 65 per cent by 2030 (Lombrana, 2021). The same month, an Australian federal court established that the environment minister of Australia has a legal duty of care not to cause harm to young people of Australia by exacerbating climate change when approving coal mining projects, a ruling that may open the door to claim damages for the impacts of climate change (ABC News, 2021). Finally, in July 2021, the Council of State – the top administrative court in France – determined that the country was not on track to meet its goal for achieving a 40 per cent cut in emissions by 2030 and ordered the Government to take "all necessary additional steps" within the coming nine months to put it on track for achieving the goals (Henley, 2021).

The finance sector also can and needs to be a strong force in leading change, as it has enormous leverage through where it chooses to invest its funds, how it prices risk, and which projects it decides to finance. Harmonized and good sustainability reporting is needed to inform such decisions. While reporting is increasing in the region, partly in response to more stock exchanges mandating reporting, it still suffers from lack of comparability. Increased availability of comparable data is required to enable investors to assess progress in transitioning their portfolios towards net zero. Finally, Governments also play an important catalysing role through where they invest their funds. By directing the investment bodies under their control to reorient their funds to sustainable investing, Governments can encourage that more funding be extended to climate-smart ventures and investments.

REFERENCES

ABC News (2021). Australian teenagers' climate change class action case opens "big crack in the wall", expert says. 27 May. Available at www.abc.net.au/news/2021-05-27/climate-class-action-teenagers-vickery-coal-mine-legal-precedent/100169398.

Ambrose, Jillian (2020). UK plans to bring forward ban on fossil fuel vehicles to 2030. T*he Guardian*, 21 September, Available at https://www.theguardian.com/environment/2020/sep/21/uk-plans-to-bring-forward-ban-on-fossil-fuel-vehicles-to-2030.

Arcelor Mittal (n.d.). Xcarb™ recycled and renewably produced. Available at https://corporate.arcelormittal.com/sustainability/xcarb/xcarb-recycled-and-renewably-produced.

Asian Development Bank Institute, and Asian Develoment Bank (ADB) (2013). *Low-Carbon Green Growth in Asia Policies and Practices.* Manila: Asian Development Bank Institute.

Bangko Sentral NG Phiipnas. (2020). *Sustainable Finance Network.* Manila: Bangko Sentral NG Phiipnas.

Buckley Tim (2019). Coal exit: top Asian banks join Europe, U.S. EnergyPost.EU, 27 May. Available at https://energypost.eu/coal-exit-top-asian-banks-join-europe-u-s/.

_____ (2021). Global finance is mobilising to meet East Asia's net-zero ambition. Instiute for Energy Economics and Financial Analysis (IEEFA), 11 May. Available at https://ieefa.org/global-finance-is-mobilising-to-meet-east-asias-net-zero-ambition/.

CDP (2020). Time to green finance: CDP financial services disclosure report 2020. Available at https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/005/741/original/CDP-Financial-Services-Disclosure-Report-2020.pdf?1619537981.

_____ (2021). CDP Report 2021 putting a price on carbon: The state of internal carbon pricing by corporates globally. Available at https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/005/651/original/CDP_Global_Carbon_Price_report_2021.pdf?1618938446 CDP.

CNN (2018). This concrete traps CO2 emissions forever | Mission ahead. 1 August, Available at YouTube: https://www.youtube.com/watch?v=DeKUlEOJ0p0&t=128s.

Carbon Footprint (n.d.). Internal carbon pricing. Available at https://www.carbonfootprint.com/internal_carbon_pricing.html.

Carbon Pricing Leadership Coalition (2019). Report of the high-level comission on carbon pricing and competitiveness. Washington DC: World Bank.

CarbonCure (n.d.). *About*. Available at https://www.carboncure.com/about/.

ChallengeZero (n.d.). Carbon negative concrete "CO2 SUICOM". Available at https://www.challenge-zero.jp/en/casestudy/616.

Chandler, David (2019). New approach suggests path to emissions-free cement. MIT News 16 September. Available at https://news.mit.edu/2019/carbon-dioxide-emissions-free-cement-0916.

Climate Champions (2021). *The heat is on: cooling's Race to Zero*. Race to Zero, 29 March. Available at https://racetozero.unfccc.int/the-heat-is-on-coolings-race-to-zero/.

Edie (2021). Cement industry plots path to net-zero through new global platform. 6 July. Available at https://www.edie.net/news/6/Cement-industry-plots-path-to-net-zero-through-new-global-platform/.

Elias Neocleous (2020). Cyprus: Regulation EU 2019/2089 – Climate related benchmarks, a contribution to a greener future? Mondaq, 27 January. Available at https://www.mondaq.com/cyprus/climate-change/887642/regulation-eu-20192089-climate-related-benchmarks-a-contribution-to-a-greener-future.

EUR-lex. (2019). Regulation (Eu) 2019/2088 o the European Parliament and of the Council of 27 November 2019 *on sustainability related disclosures in the financial services sector.* Available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02019R2088-20200712&from=EN.

European Commission (n.d.a). Corporate sustainability reporting. Available at https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

European Parliament (2020). The potential of hydrogen for decarbonising steel production. Breifing. Available at https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/641552/EPRS_BRI(2020)641552_EN.pdf. European Parliament.

Fuentes, Ursula, and Anna Chapman (2021). Shifting investment from fossil fuels in Southeast Asia. Friedrich-Ebert-Stiftung policy brief. Available at https://asia.fes.de/news/fossil-fuel-divestment.

GHG Protocol (2021). New standard developed to help financial industry measure and report emissions. Press release, 18 March. Availabe at https://ghgprotocol.org/blog/new-standard-developed-help-financial-industry-measure-and-report-emissions.

Global Sustainable Investment Alliance (2021). 2020 global sustainable investment review. Available at www.gsi-alliance.org/wp-content/uploads/2021/07/GSIR-2020.pdf.

Henley, Jon (2021). French court orders government to act on climate in next nine months, *The Guardian*, 1 July. Available at https://www.theguardian.com/world/2021/jul/01/french-court-orders-government-to-act-on-climate-in-next-nine-months.

IFRS (2021). *Is there a path to global sustainability standards?* 29 June. Available at https://www.ifrs.org/news-and-events/news/2021/06/is-there-a-path-to-global-sustainability-standards/.

International Energy Agency (IEA) (2021). *Net Zero by 2050: A Roadmap for the Global Energy Sector.* Paris: IEA Publications.

Howard, Emma (2015). A beginner's guide to fossil fuel divestment. *The Guaridan*, 23 June. Available at https://www.theguardian.com/environment/2015/jun/23/a-beginners-guide-to-fossil-fuel-divestment.

James, Andew, and Schwana Kwan (2021). From Singapore to rio green buildings keep tropical tenants cool.Bloomberg Green. 6 May. Available at https://www.bloomberg.com/news/features/2021-05-06/these-green-buildings-keep-people-cool-in-singapore-brazil-and-hong-kong?cmpid=BBD050721_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=210507&utm_campaign=greendaily.

Kaminski, Isabella (2019) *Carbon Majors Can Be Held Liable for Human Rights Violations, Philippines Commission Rules.* Available at https://www.business-humanrights.org/en/latest-news/carbon-majors-can-be-held-liable-for-human-rights-violations-philippines-commission-rules/.

KPMG (2020). *The time has come: The KPMG Survey of Sustainability Reporting 2020.* Available at https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/11/the-time-has-come.pdfKPMG.

Kapoor, Kanupriya (2021). Asian Development Bank to end coal, upstream oil and gas financing – draft statement. Reuters, 10 May.

Lee, Daniel (2020). Businessess move forward with carbon pricing. MPFD Policy Brief No. 109. Bangkok: ESCAP.

Lombrana, Laura (2021). Teenagers Are Winning Climate Fights One Court Case at a Time. Bloomberg Green, 17 May. Available at . https://www.bloomberg.com/news/articles/2021-05-17/teenagers-are-winning-climate-fights-one-court-case-at-a-time.

Monetary Authority of Singapore (n.d.). Sustainable finance. Available at Monetary Authority Singapore: https://www.mas.gov.sg/development/sustainable-finance.

Naimoli, Stephen, and Nikos Tsafos (2020). Climate solutions series: decarbonizing global transport. CSIS Briefs. Available at https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/20720_Naimoli_Tsafos_Decarbonizing%20Global%20Transport_V6_UPDATED%20FINAL.pdf.

Nelson, Arthur (2015). Dutch Government ordered to cut carbon emissions in landmark ruling. *Guardian*, 24 June. Available at https://www.theguardian.com/environment/2015/jun/24/dutch-government-ordered-cut-carbon-emissions-landmark-ruling.

Network of Central Banks and Supervisors for Greening the Financial System or Greening the Financial System (NGFS) (2019). Origin and purpose. 13 September. Available at https://www.ngfs.net/en/about-us/governance/origin-and-purpose.

Organisation for Economic Co-operation and Development (OECD) (2019). FDI qualities indicators: Measuring the sustainable development impacts of investment. Available at https://www.oecd.org/investment/FDI-Qualities-Indicators-Measuring-Sustainable-Development-Impacts.pdf.

Piper, Elizabeth, and Marcus Wacket (2021). In climate push, G7 agrees to stop international funding for coal. Reuters, 21 May. Available at https://www.reuters.com/business/energy/g7-countries-agree-stop-funding-coal-fired-power-2021-05-21/.

Pucker, Kenneth (2021). Overselling sustainability reporting. *Harvard Business Review,* May–June. Available at https://hbr.org/2021/05/overselling-sustainability-reporting.

Reuters (2021). Moody's flags big oil's rising risk from climate battle. 28 May. Available at https://www.reuters.com/business/energy/moodys-flags-big-oils-rising-risk-climate-battle-2021-05-28./.

SSAB (n.d.). Fossil-free-steel. Available at https://www.ssab.com/company/sustainability/sustainable-operations/hybrit.

Scania (2021). Fossil – free steel a giant step in Scania's decarbonisation. 1 March. Available at https://www.scania.com/group/en/home/newsroom/news/2021/fossil-free-steel-a-giant-step-in-scanias-decarbonisation.html.

Science Based Targets (2021). *330+ target-setting firms reduce emissions by a quarter in five years since Paris Agreement.* 26 January. Available at https://sciencebasedtargets.org/news/330-target-setting-firms-reduce-emissions-by-a-quarter-in-five-years-since-paris-agreement.

ScienceDaily (2019). How buildings can cut 80 percent of their carbon emissions by 2050. 15 August. Available at https://www.sciencedaily.com/releases/2019/08/190815113733.htm.

Scott, Matt, and Tony Rooke (2020). TCFD: coming, ready or not. Willis Towers Watson, 19 November. Available at https://www.willistowerswatson.com/en-VN/Insights/2020/11/TCFD-coming-ready-or-not.

The Edge (2021). Bursa Malaysia: Moving the dial on ESG adoption. 22 February. Available at https://www.msn.com/en-my/money/topstories/bursa-malaysia-moving-the-dial-on-esg-adoption/ar-BB1dT7Tx.

United Kingdom (2019). Green finance strategy. Policy paper. London: HM Government.

United Nations Conference on Trade and Development (UNCTAD) (2015). Investment Policy Framework for Sustainable Development. Available at https://unctad.org/system/files/official-document/diaepcb2015d5_en.pdf.

United Nations, Economic and Social Commission for Asia and the Pacific (2019). Using smart technologies to mitigate greenhouse gas emissions from the transport sector in Asia. Available at https://www.unescap.org/sites/default/d8files/knowledge-products/UsingSmartTransportTechnologies_July2021.pdf.

_____ (2020). *Realizing environmental benefits through policy convergence and enhanced regional cooperation.* Note by the secretaritat,Committee on Environment and Development, Bangkok, 9–10 December (ESCAP/CED/200/2).

_____ (2021a). *Regional Trends Report 2021: Shaping a Sustainable Energy Future in Asia and the Pacific: A Greeener More Resilient and Inclusive Energy System.* United Nations publication. Sales no. E.19.II.F.3.

_____ (2021b). *Coal Phaseout and Energy Transition Pathways for Asia and the Pacific.* Bangkok, ESCAP.

_____ (forthcoming). Developing comprehensive general and sector-based indicators for assessing the contribution of FDI to sustainable development.

United Nationis Environment Programme (UNEP) (2020). *Emissions Gap Report.* Nairobi: UNEP.

United Nationis Environment Programme Finance Initiative (UNEP FI) (2021a). Policy info: taxonomy in Asia. Available at https://www.unepfi.org/regions/asia-pacific/taxonomy-asia/.

_____ (2021b). World's Leading Insurers and reinsurers and UN Environment Programme to establish pioneering Net-Zero Alliance Insurance Alliance. 21 April. Available at https://www.unepfi.org/climate-change/un-convened-net-zero-insurance-alliance/.

_____ (n.d.). Net-Zero Banking. Available at https://www.unepfi.org/net-zero-banking%20/.

Uyen, Nguyen, Dan Murtaugh, and John Bordeau (2021). As banks shun coal, Vietnam emerges an unlikely solar champion. Bloomberg Green, 19 May. Available at https://www.bloomberg.com/news/features/2021-05-19/as-banks-shun-coal-solar-surges-in-vietnam.

World Federation of Exchanges and Sustainable Stock Exchanges Initiative (2019). How exchanges can embed sustainability within their operation: a blueprint to advance action. Available at https://sseinitiative.org/wp-content/uploads/2019/12/SSE-WFE-Embedding-Sustainability-Report.pdf.

Yas (2021). South Korea joins list of developed nations to cease funding future overseas coal projects as Indonesia boost efforts to curb emissions. The Online Citizen, 8 May. Available at https://www.theonlinecitizen.com/2021/05/08/south-korea-joins-developed-nations-to-cease-funding-future-overseas-coal-projects-as-indonesia-boost-efforts-to-curb-emissions/.

Yi, Shi (2020). AIIB's new no-coal pledge puts spotlight on China's overseas energy investment. China Dialogue 18 November. Available at https://chinadialogue.net/en/business/aiibs-new-no-coal-pledge-china-overseas-energy-investment/.

Zembrowsik, Piotr, Mary Leung, and Kurt Schacht (2019). ESG disclosures in Asia Pacific: a review of esg disclosure regimes forlisted companies in selected markets. Available at https://www.cfainstitute.org/advocacy/policy-positions/esg-disclosures-apac.

CHAPTER

Regional trade agreements: a tool to promote climate-smart trade

The previous chapters explained how trade and investment, aided by government action and the private sector, can help to address climate change. This chapter specifically focuses on the existing and potential ways regional trade agreements (RTAs), including economic partnership agreements,[1] can be harnessed to contribute to and coordinate more effectively international collaboration on climate change concerns.

"Climate-related provisions in RTAs can help promote climate change adaptation, mitigation and resilience-building."

As noted in chapter 2, many RTAs contain climate-related provisions. In this report, "climate-related provision" refers to provisions that relate to climate action; GHG emissions; sustainable energy; environmental goods,

[1] Regional trade agreements comprise bilateral and plurilateral trade agreements, free trade agreements and economic partnerships agreements that aim at liberalizing trade between partner countries.

Box 4.1

Examples of how RTAs can foster climate-smart trade

- Diffuse environmental goods and services key for climate adaptation and mitigation by reducing tariff and non-tariff barriers
- Set out commitments to cooperate on climate issues, such as energy efficiency and building climate resilience.
- Discipline harmful subsidies and promote transparency
- Promote the harmonization, adoption and application of internationally recognized climate standards
- Require the ratification and/or implementation of relevant multilateral environmental agreements
- Hold parties accountable for their carbon neutrality commitments and obligations
- Set in place mechanisms to monitor and evaluate the agreement's impacts on climate

services and technologies; carbon market mechanisms and carbon taxes; and fossil fuel subsidies.[2] They can be considered a subset of environmental provisions that relate to a broader array of issues, such as the management of natural resources and the conservation of ecosystems and biodiversity. Climate-related provisions in RTAs can help promote climate change adaptation, mitigation and resilience-building by, for example, removing tariff and non-tariff barriers to trade in environmental goods and services, prohibiting the provision of environmentally harmful subsidies and fostering cooperation on climate action (see box 4.1).

OECD (2007) identifies four underlying drivers for the inclusion of environmental provisions in RTAs, including climate-related provisions, namely (a) contributing to the overarching goal of sustainable development; (b) ensuring a level playing field among Parties to the agreement; (c) enhancing cooperation in environmental matters of shared interest; and/or (d) pursuing an international environmental agenda. The heterogeneity of climate-related provisions in RTAs, even in those signed by the same country, highlights that these drivers have different effects and that negotiating these provisions is a dynamic process. Countries' views and positions on whether and how to address climate issues in RTAs can evolve over time. Factors, such as pressure from civil society, the strength of the political mandate and differences in environmental performance, market size and geographic location, can also influence climate-related provisions in RTAs (Jinnah and Lindsay, 2016; Monteiro and Trachtman, 2020).

Provisions dealing with climate issues can be incorporated into RTAs in several ways, including in the preamble, articles/chapters specific (or not) to the environment or side agreements. The different structures and forms of climate-related provisions are not necessarily mutually exclusive and the substance of the provisions themselves matters more than the form (UNEP and IISD, 2016). Some provisions not directly linked to climate also can play an important role in addressing climate-related challenges, such as those relating to technical barriers to trade, sanitary and phytosanitary measures, and intellectual property rights. However, analysis of these provisions falls outside of the scope of this chapter.

[2] **Climate action**: Provisions pertaining to climate change mitigation and adaptation, prevention of global warming, cooperation in this area, relevant institutional arrangement, adherence to, for example, a multilateral environment agreement; **sustainable energy**: provisions pertaining to promotion of energy efficiency and renewable energy, in general or in the form of specific technologies, expressed as general declarations or specific actions; **greenhouse gas emissions**: provisions pertaining to reduction of GHG emissions, their capture, storage, sequestration and elimination, including through sustainable management of forests and land use; **environmental goods, services and technologies**: promotion of trade in environmental goods and services, including energy efficiency and renewable energy-related technologies and services, and including through responsible procurement and sustainable production methods; **carbon tax and carbon market mechanism**: provisions pertaining to emission allowance trading mechanisms and carbon tax; **fossil fuels**: provisions pertaining to fossil fuel subsidies.

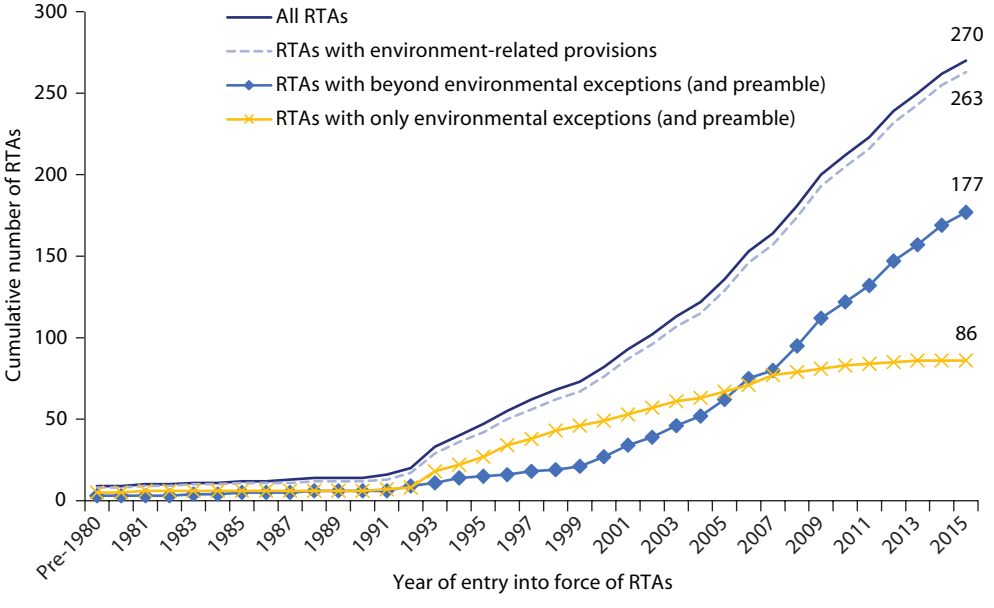
"Given the threat posed by the climate crisis, urgent action is needed to ensure that RTAs mutually support countries' climate change mitigation efforts and trade objectives."

On aggregate, trade liberalization has increased trade of carbon-intensive and environmentally harmful products, such as fossil fuels, more than it has for environmental goods (Economist Intelligence Unit, 2019). Given the threat posed by the climate crisis, urgent action is needed to address this imbalance and ensure that RTAs mutually support countries' climate change mitigation efforts and trade objectives. Accordingly, this chapter explores how RTAs in the Asia-Pacific region incorporate climate-related provisions and their potential to promote climate-smart trade. It begins with a brief discussion of the evolution of RTAs and the inclusion of environmental provisions before moving on to analyse the climate-related content of RTAs in the Asia-Pacific region. Section four examines differing approaches to the incorporation of environment and climate provisions in two megaregional trade agreements, and section five looks to the future and outlines how RTAs can be better leveraged to support climate objectives before policy recommendations are provided in section six.

A. THE EVOLUTION OF RTAs AND THEIR IMPACT ON THE ENVIRONMENT

Multilateral trade rules provide the best guarantee for achieving substantive environmental objectives for all WTO members and continue to form the basis of most trade agreements. However, as multilateral trade negotiations at the WTO have made slow progress, the number of RTAs being negotiated globally has increased steadily over the past three decades (figure 4.1). The number of RTAs involving Asia-Pacific countries has increased particularly rapidly; as of December 2020, more than 200 RTAs have been signed or are in force and another 95 are under negotiation (ESCAP, 2020). Although some view RTAs as a potential "stumbling block", others believe they can serve as "building blocks" for future multilateral trade governance (OECD 2007).

Figure 4.1 **Evolution of RTAs with environmental provisions**



Source: Monteiro (2016).

"The number of RTAs has increased rapidly and many now contain chapters pertaining to environment or sustainable development."

Indeed, most RTAs set commitments that go beyond WTO agreements, making them useful vehicles for dealing with environmental issues – including climate change – and provide opportunities to learn through experience. Over time, the general trend among RTAs is to include more environmental provisions, but also a broadening in their scope and deepening in stringency (Jinnah and Morgera, 2013). Many RTAs now contain full stand-alone environment or sustainable development chapters that address enforcement and implementation issues.

Through RTAs, countries can increase cooperation on environmental issues and negotiate – at a quicker pace – environmental commitments that go beyond what has been possible multilaterally (Lamy and others 2020a). In some cases, the inclusion of environmental provisions in RTAs has helped strengthen and harmonize environmental regulations and facilitate capacity-building. These provisions can also help articulate new environmental norms and diffuse environmental policies across borders (Morin and others, 2017; Jinnah and Lindsay, 2016). Despite this, only a few types of environmental provisions are widespread and fragmentation remains an issue (Monteiro, 2016). As shown in figure 4.1, until 2005, most RTAs globally only included provisions providing for environmental exceptions. Since then, however, RTAs consistently feature deeper environmental provisions, including climate-related provisions.

"Environmental provisions in RTAs may not substantially reduce exports, and can help promote green exports from developing countries."

Evidence of the impacts of trade agreements on the environment is relatively thin and mostly theoretical (Abman, Lundberg and Ruta, 2021). However, some evidence indicates that RTAs that include sanctions and RTAs based on environmental cooperation when paired with a strong civil society in partner countries improve environmental performance (measured on the basis of the Environmental Performance Index) (Bastiaens and Postnikov, 2014). In a recent study, Abman, Lundberg and Ruta (2021) find that the inclusion of specific provisions aimed at protecting forests and/or biodiversity reduce forest loss relative to RTAs that do not include them. Other studies reveal that environmental provisions in RTAs can promote domestic environmental legislation and reduce air pollution and CO2 emissions (Baghdadi, Martinez-Zarzoso and Zitouna, 2013; Bastiaens and Postnikov, 2017; Brandi and others, 2019; Martínez-Zarzoso and Oueslati, 2016; Zhou, Tien and Zhou, 2017; Kolcava and others, 2019).

Regarding impact of environmental provisions on trade flows, Brandi and others (2020) find that environmental provisions in trade agreements do not substantially reduce exports from developing countries. Moreover, the authors find that environmental exceptions to trade commitments can decrease dirty exports, while liberal environmental provisions promote green exports from developing countries. This indicates that win-win opportunities exist for expanding trade and pursuing environmental goals.

B. CLIMATE-RELATED PROVISIONS IN ASIA-PACIFIC RTAs

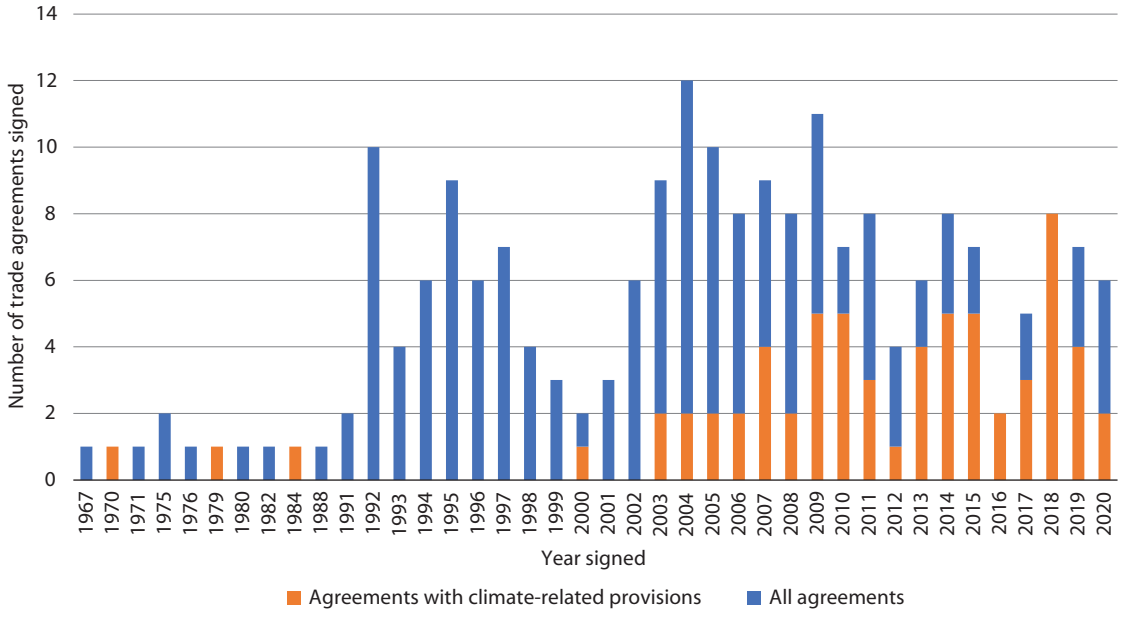
As already indicated, the number of RTAs incorporating climate-related provisions is following an upward trend (see figure 4.2). Almost half of the Asia-Pacific RTAs with climate-related provisions contain a dedicated environment, climate or sustainable development chapter. Two agreements, EU-Armenia (2018) and EU-Georgia (2014), include specific chapters on each climate action, the environment, and trade and sustainable development.

"Eighty-five per cent of the RTAs that involve an Asia-Pacific economy and contain at least one climate-related provision were signed after 2005."

Of the 208 RTAs concluded between 1967 and 2020 involving an Asia-Pacific economy, 65 (31 per cent) contain at least one climate-related provision. Of these RTAs, 8 per cent were signed after 2005. Only 23 of the 65 RTAs include explicit references to the term "climate"[3], most of these entered into force after

[3] As it relates to nature and climate change, not "business climate" or any such term.

Figure 4.2 **All RTAs versus RTAs with climate related provisions in Asia-Pacific region**



Source: Authors' calculations.

2015. Some of the most recent RTAs that directly refer to climate change involved China and Mauritius, the European Union and Viet Nam, the United Kingdom and Japan, and Peru and Australia. In some RTAs, the term is used narrowly, for example, in reference to the United Nations Framework Convention on Climate Change (UNFCCC), while in others, such as the agreements between the United Kingdom and Japan and the European Union and Viet Nam, contain wide-ranging provisions that directly address climate change.

The European Union, the Republic of Korea, and Japan all are featured more than once in table 1, which highlights the top 10 RTAs involving an Asia-Pacific economy with the most climate-related articles. The strong position these countries have taken in tackling climate change might explain their prominence in the leaderboard. The European Union and New Zealand also have enacted laws requiring the integration of trade and environment policies, which could also help explain the relatively high number of climate-related provisions. However, not all RTAs follow this pattern and there are important idiosyncratic trends.

"RTAs with the most climate-related articles that include an Asia-Pacific economy most often involve the European Union, the Republic of Korea and Japan."

The agreements listed in table 4.1 were signed in or after 2014, 60 per cent of them are between developed countries (North-North) and 40 per cent were signed by developed and developing countries (North-South). No South-South agreements are listed in the top 10. All of the top 10 agreements include a dedicated environment, sustainable development and/or climate chapter and all but three RTAs explicitly reference the term "climate".

As indicated in table 4.2, most of the climate-related articles found 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 GHG emissions (17 per cent). Very few of them refer to fossil fuel subsidies or carbon tax and carbon market mechanisms. This breakdown is very similar to what is found when analysing the RTAs concluded between 1948 and 2020.

Table 4.1 Top 10 Asia-Pacific RTAs with the most climate-related provisions

PTA	Entry into force	Number of articles with climate-related provisions	Development status**	Explicit climate reference	Chapter on environment/ climate/ sustainable development
European Union-Viet Nam	2020	13	North-South	Yes	Yes
European Union-Armenia	2018	13	North-South	Yes	Yes
European Union-Georgia	2016	13	North-South	Yes	Yes
Republic of Korea-Australia	2014	11	North-North	Yes	Yes
European Union-Singapore	2019	9	North-North	Yes	Yes
United Kingdom-Japan	2020	8	North-North	Yes	Yes
European Union-Japan	2019	8	North-North	Yes	Yes
Republic of Korea-New Zealand	2015	8	North-North	No	Yes
CPTPP	2018	6	North-South	No	Yes
Canada – Republic of Korea	2014	6	North-North	No	Yes

* According to TREND.

** World Bank classification (High income = developed; low, lower-middle and upper middle = developing).

Notes: PTA, preferential trade agreement; CPTPP, Comprehensive and Progressive Agreement for Trans-Pacific Partnership.

Table 4.2 Number of RTAs and articles addressing specific climate related topics

Area	No. of RTAs		No. of articles	
	Asia-Pacific region	Total	Asia-Pacific region	Total
Carbon tax and carbon market mechanism	2	4	2	4
Climate action	41	71	98	177
Environmental goods, services and technologies	43	66	78	125
Fossil fuel subsidies	1	1	2	2
GHG emissions	26	49	50	93
Sustainable energy	31	57	57	99

Notes: RTA, regional trade agreement; GHG, greenhouse gas.

"Climate-related articles in Asia-Pacific RTAs mainly call for climate action (34 per cent) or promote environmental goods, services and technologies (27 per cent); very few of them refer to fossil fuel subsidies or carbon markets."

The scope and specificity of climate-related provisions varies significantly across agreements. Table 4.3 highlights examples of climate-related provisions included in Asia-Pacific RTAs by topic to provide a sense of the variability. Most climate-related provisions include soft language, such as statements of intent that reaffirm commitments made elsewhere or provide a broad basis for cooperation, while others, such as the Peru-Republic of Korea RTA, incorporate commitments to adopt policies and measure with concrete examples.

Table 4.3

Examples of climate-related provisions by topic

PTA details	Topic	Text
Chile-Indonesia		
Chapter: Cooperation Article 9.5: Cooperation on Environmental Issues	Climate action	6. These areas [of cooperation] may include, but are not limited to: (a) Climate change; (b) Biodiversity and conservation of natural resources.
Peru-Republic of Korea		
Chapter: Environment Article 19.8: Climate change	Climate action	2. For promoting sustainable development, each Party, within its own capacities, shall adopt policies and measures on issues such as: (a) Improvement of energy efficiency; (b) Research, promotion, development and use of new and renewable energy, technologies of carbon dioxide capture, and updated and innovative environmental technologies that do not affect food security or the conservation of biological diversity; and (c) Measures for evaluating the vulnerability and adaptation to climate change.
TPP (CPTPP)		
Chapter: Environment Article 20.15: Transition to a Low Emissions and Resilient Economy	Climate action	2. Parties shall cooperate to address matters of joint or common interest. Areas of cooperation may include, but are not limited to: energy efficiency; development of cost-effective, low emissions technologies and alternative, clean and renewable energy sources; sustainable transport and sustainable urban infrastructure development; addressing deforestation and forest degradation; emissions monitoring; market and nonmarket mechanisms; low emissions, resilient development and sharing of information and experiences in addressing this issue. Further, the Parties shall, as appropriate, engage in cooperative and capacity-building activities related to transitioning to a low emissions economy.
Peru-Republic of Korea		
Chapter: Environment Article 19.4: Trade Favouring Environment	Environmental goods, services and technologies	1. The Parties shall strive to facilitate and promote trade and foreign direct investment in environmental goods and services. 2. The Parties agree to identify a list of environmental goods and services of mutual interest and to facilitate their trade. Such list could be modified upon request of either Party.
EU-Singapore		
Article 13.11	Environmental goods, services and technologies	2. The Parties shall pay special attention to facilitating the removal of obstacles to trade or investment concerning climate-friendly goods and services, such as sustainable renewable energy goods and related services and energy efficient products and services, including through the adoption of policy frameworks conducive to the deployment of best available technologies and through the promotion of standards that respond to environmental and economic needs and minimize technical obstacles to trade.

Table 4.3 *(continued)*

PTA details	Topic	Text
Republic of Korea-India		
Chapter: Bilateral Cooperation Article13.13: Renewable Energy Resources	Sustainable energy	1. The Parties, recognizing the importance of development of renewable energy resources in their respective economies, agree to cooperate in research, design and development of various renewable energy technologies, including solar, wind, bioenergy, and others as mutually agreed. 2. The cooperation pursuant to paragraph 1 may include, but is not limited to the following forms: (a) Exchange of policy and technical information; (b) Exchange of personnel including scientists, policymakers, and other experts; (c) Organization of joint seminars, workshops, etc.; (d) Promoting joint research and development projects; and (e) Facilitating investments and joint ventures.
EFTA-Philippines		
Chapter: Trade and Sustainable Development Article 11.8: trade in forest-based products	GHG emissions	1. In order to promote the sustainable management of forest resources and thereby, *inter alia*, reduce GHG emissions from deforestation and degradation of natural forests and peat lands related to activities beyond the forest sector, the Parties will work together in the relevant multilateral forums in which they participate and through existing bilateral cooperation if applicable to improve forest law enforcement and governance and to promote trade in legal and sustainable forest-based, agricultural and mining products.
European Union-Singapore		
Chapter: Trade and Sustainable Development Article 12.11: Trade and Investment Promoting Sustainable Development	Fossil fuel subsidies	3. The Parties recognize the need to ensure that, when developing public support systems for fossils fuels, proper account is taken of the need to reduce greenhouse gas emissions and of the need to limit distortions of trade as much as possible. While subparagraph 2(b) of Article 11.7 (prohibited subsidies) does not apply to subsidies to the coal industry, the Parties share the goal of progressively reducing subsidies for fossil fuels. Such reductions may be accompanied by measures to alleviate the social consequences associated with the transition to low carbon fuels. In addition, both Parties will actively promote the development of a sustainable and safe low-carbon economy, such as through investment in renewable energies and energy efficient solutions.
Republic of Korea-Turkey		
Chapter: Trade and Sustainable Development Article 5.10: Cooperation	Carbon tax and carbon market mechanism	2. In order to promote the achievement of the objectives of this Chapter and to assist in the fulfilment of their obligations pursuant to it, the Parties have established the following indicative list of areas of cooperation:

Table 4.3 *(continued)*

PTA details	Topic	Text
		(f) Cooperation on trade-related aspects of the current and future international climate change regime, including issues relating to global carbon markets, ways to address adverse effects of trade on climate, as well as means to promote low-carbon technologies and energy efficiency;
Japan-Mexico		
Chapter: Bilateral Cooperation Article 147.1: Cooperation in the Field of Environment	Carbon tax and carbon market mechanism	2. Cooperative activities under this Article may include: (b) Promotion of capacity and institutional building to foster activities related with the Clean Development Mechanism under the Kyoto Protocol to the United Nations Framework Convention on Climate Change, as may be amended, by means of workshops and dispatch of experts, and exploration of appropriate ways to encourage the implementation of the Clean Development Mechanism projects.

Notes: TPP, Trans Pacific Partnership; CPTPP, Comprehensive and Progressive Agreement for Trans-Pacific Partnership; EFTA: European Free Trade Association.

"Climate-related provisions vary greatly across agreements. They are typically statements of intent or cooperation, and contain few binding commitments."

The variability of climate content is also evident in the most recent Asia-Pacific RTAs. For example, RTAs entering into force in 2020 or 2021 contain the following climate-related content:

- **China-Mauritius (2021)** – Contains commitments to cooperate to promote sustainable agriculture to increase resilience to climate change.
- **European Union-Viet Nam (2020)** – Contains a comprehensive chapter on trade and sustainable development, and includes a specific article on climate change.
- **Peru-Australia (2020)** – Contains a chapter on environment.
- **Australia-Hong Kong, China (2020)** – Includes several general exemption clauses.
- **United Kingdom-Japan (2020)** – Contains a comprehensive chapter on trade and sustainable development, but without an article on climate change.

Of the above-mentioned RTAs, the Australia-Hong Kong, China and China-Mauritius agreements do not include a chapter on environment/sustainable development. The China-Mauritius agreement does not include a direct reference to the term "climate", however both countries include direct references to the term in other agreements. The European Union-Viet Nam and United Kingdom-Japan RTAs are by far the most comprehensive with regard to climate-related provisions.

The following section focuses on two recent megaregional trade agreements that also differ significantly in terms of their environment and climate-related content despite many similarities in terms of membership and timing.

C. CPTPP AND RCEP: DIFFERING APPROACHES TO THE ENVIRONMENT AND CLIMATE

Two new megaregional trade agreements, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP), are politically and economically significant for the Asia-Pacific region but vary markedly in terms of their level of ambition, including in relation to climate and the environment. RCEP – counting for about 30 per cent of global GDP, world population and world trade –

was signed in 2020 by Australia, China, Japan, the Republic of Korea, New Zealand and the 10 members of ASEAN.[4] It incentivizes regional supply chains but says almost nothing about the environment or climate change.[5] CPTPP was signed by 11 countries[6] in 2018 and covers approximately half a billion people, and 15 per cent of the global GDP and global trade. It contains some 137 environmental provisions[7] and has a stand-alone chapter on the environment.

"The two new megaregional trade agreements in Asia-Pacific, RCEP and CPTPP, vary markedly in terms of their level of ambition in relation to climate and the environment."

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership contains provisions requiring Parties to effectively enforce domestic environmental laws and prohibiting the loosening of environmental laws to encourage trade and investment. It also contains non-binding commitments that lay the foundation for Parties to collectively address a range of trade-related environmental challenges, such as protecting the ozone layer and combatting illegal wildlife trade. Notably, CPTPP is the first trade agreement to include binding commitments that prohibit the provision of certain types of fisheries subsidies that negatively affect overfished stocks.

While there is no reference to the term climate or climate change in CPTPP, energy efficiency, renewable energy, sustainable infrastructure development, and deforestation are listed as areas of interest for cooperation. For example, some of the CPTPP climate-related provisions state that Parties:

- Affirm their commitment to implement the multilateral environmental agreements to which they are party and maintain a dialogue on the negotiation and implementation of relevant multilateral environmental agreements.
- Agree to cooperate on actions to support the transition to a low emissions economy and, as appropriate, engage in capacity-building activities. Areas of cooperation may include: energy efficiency, development of cost-effective, low emissions technologies, and alternative, clean and renewable energy sources.
- Shall endeavour to address any potential barriers to trade in environmental goods and services and may develop bilateral and plurilateral cooperative projects on environmental goods and services.

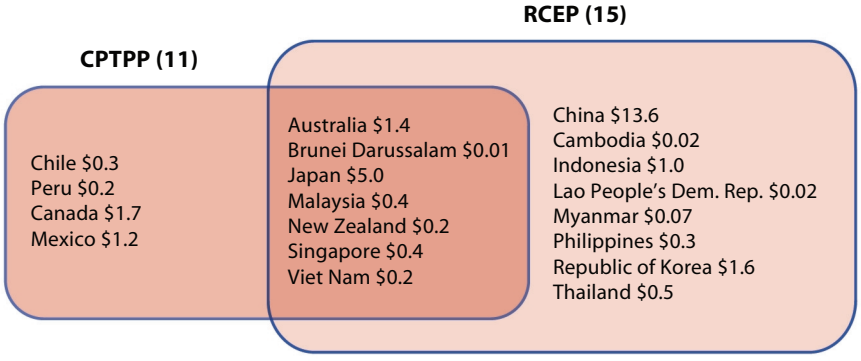
The CPTPP environment chapter is subject to an enforcement mechanism that includes a three-step consultation process for Parties seeking to resolve any disputes that arise. If Parties fail to resolve a dispute through consultations, they may use the procedures in the CPTPP Dispute Settlement Chapter. While CPTPP incorporates a significant number of environment and climate-related provisions, most clauses are based on cooperation, consultation, and best endeavour and lack specificity.

Given the CPTPP and RCEP where negotiated around the same time and include seven members in common (see figure 4.3), a key question then is: Why are environment and climate issues excluded in RCEP? While there is no clear answer, past treaty texts that influenced the final text of the agreements, countries that were central in driving the negotiating process, and the levels of development of member countries can provide some useful insights.

The contents of the original TPP (now CPTPP) were taken disproportionately from United States agreements and reflected United States preferences (Allee and Lugg, 2016). Analysis by the European Union found that approximately 30 per cent of the RCEP text is duplicated from CPTPP and TPP. The United States-Mexico-Canada agreement and recent RTAs of Australia were also found to be quite influential. Ultimately, however, there is no clear template used as a basis for the text of RCEP (European Union, 2021).

[4] The members of ASEAN are Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.
[5] RCEP includes provisions affirming the rights and responsibilities of each Party under the Convention on Biological Diversity and related to the protection of genetic resources, traditional knowledge, and folklore.
[6] The countries party to the CPTPP are Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore and Viet Nam.
[7] According to TREND Analytics.

Figure 4.3 **Members of RCEP and CPTPP (numbers present 2018 GDP in trillions of U.S. dollars)**



Source: Petri and Plummer (2020).

Consolidating the existing ASEAN+1 agreements into one was an important driver behind the launch of RCEP negotiations (European Union, 2021). Accordingly, ASEAN played a key role in facilitating the agreement. The relatively few meaningful environmental provisions in ASEAN trade agreements might help explain the exclusion of environmental and climate-related provisions from RCEP.

Moreover, the membership configuration of RCEP may also be a contributing factor. All countries party to CPTPP are either classified as being high or upper-middle income; Viet Nam (a lower middle-income country) is the only exception. The RTAs of Viet Nam with the European Union and other Governments that contain significant environmental content, probably has paved the way for the country to agree to the extensive environmental commitments in CPTPP. RCEP, on the other hand, involves countries with very different levels of economic development and a higher number of lower middle-income members, including Cambodia, Indonesia, the Lao People's Democratic Republic, Myanmar and the Philippines. The lower ambition of RCEP in this regard may be in part attributed to the need to cater to this variability in levels of development and capacity, as evidenced by the exclusion of non-trade concerns, including the environment.

Box 4.2 **COVID-19 pandemic and RTAs**

The COVID-19 crisis has caused economic shockwaves around the globe, highlighting the interconnectedness of countries through global value chains and the importance of a resilient trading system. RTAs can help accelerate the post-crisis recovery by, for example, lowering the cost of trade and expediting the movement of goods across borders. By incorporating robust environment and climate-related provisions, RTAs can help ensure that economic recovery through trade does not come at the expense of the environment.

As this chapter has highlighted, commitments in RTAs can support countries towards achieving their economic, social and environmental goals by, for example, building climate resilience and promoting export diversification into green sectors. In putting sustainability front and centre in trade and investment decision-making, countries can build back better in the aftermath of the COVID-19 pandemic.

D. LOOKING TO THE FUTURE: MAKING RTAs MORE CLIMATE SMART

"Climate change is the defining issue of our time and we are at a defining moment" warned Secretary-General, Antonio Guterres. If we are to achieve the transformative change required to address the climate crisis, trade agreements must be formulated to contribute – not counteract – climate action. Indeed, ACCTS, for example, highlights the possibility for RTAs to bring together some of the interrelated elements of the climate change, trade and sustainable development agendas and demonstrate how they can be mutually reinforcing.

"To address the climate crisis, trade agreements must be formulated to contribute – not counteract – climate action; ACCTS could provide a useful model."

Other countries in the region, such as Australia, Japan, the Republic of Korea and Singapore, are also showing leadership in the incorporation of climate-related provisions in their RTAs. Unfortunately, not all countries share the same view; some are hesitant to address climate-related issues in RTAs over concerns about the creation of new export barriers, slowing negotiations, the economic implications of adopting higher environmental standards or the resources required to implement such commitments, for example (OECD, 2007; George, 2014).

Regarding RTAs that do not incorporate climate-related provisions, challenges remain. These RTAs have yet to live up to their potential in terms of fostering climate-smart trade. There are concerns that existing climate-related provisions in RTAs fail to address the full range of relevant issues, are too vague, and are not sufficiently enforceable. Indeed, climate provisions are considered some of the least robust environmental provisions within RTAs because they remain weakly "legalized", lack replicability, and are not widely to be adopted by the GHG emitters (Morin and Jinnah, 2018). Moreover, general provisions (those not directly related to the environment or climate) often have the potential to undermine or reduce the scope for climate action (Deere Birkbeck, 2021). For developing countries that incorporate climate-related provisions, the strength of their environmental laws and institutions can present a barrier to their effective implementation (Berger and others, 2020).

"As large trade partners of the Asia-Pacific region step up actions on climate change, future RTAs are likely to include climate-related provisions covering a wider range of issues, such as those related to green investment and public procurement."

Globally, an increasing number of countries are stepping up their actions to tackle climate change, with a growing number of jurisdictions setting carbon-neutrality targets, including the European Union and the United States. This is likely to translate into increased levels of ambition in RTAs in relation to climate change and certain issues that may have never been addressed, or addressed infrequently, could start to feature more prominently. For example, future RTAs could more readily address the following:

Investor State Dispute Settlement: Many RTAs have provisions related to investment protection. These provisions are usually similar to the provisions in bilateral investment agreements, which often include clauses related to investor-state dispute settlement (ISDS). Such provisions should be reviewed to ensure they do not inadvertently hinder the adoption of ambitious climate policy by Governments out of concerns for litigation. An increasing number of ISDS disputes brought under RTAs relate to the environment and climate change; between 1987 and 2017, 75 (9 per cent) out of all known 855 cases were environment related (Yamaguchi, 2020). The scope of ISDS clauses must be carefully drafted in a manner that secures States' right to regulate and includes strong commitments on transparency. Provisions to facilitate green investment via trade and investment agreements, such as renewable energy deployment, could also be expanded.

Climate-friendly public procurement: Many RTAs include public procurement chapters and reference the environment in their provisions regulating tenders, but none include specific obligations to use low-carbon goods and services in procurement (Economist Intelligence Unit, 2019). Future RTAs could, for example, expand the scope for public authorities to take climate-change considerations into account in the technical specifications, requirements for tenderers, award criteria, or the performance of the contract (van Asselt and others, 2006; Frey, 2015).

Border carbon adjustments: Border carbon adjustments aim to support the effective implementation of a carbon price within a country or group of countries by limiting "carbon leakage" resulting from the relocation of carbon-intensive production to countries with lower carbon prices (Lamy and others, 2020b). While some RTAs include provisions relating to carbon markets, as highlighted in section 3, none currently make reference to a border carbon adjustment tax. While technical and political challenges remain, future RTAs could include commitments on carbon border adjustment mechanisms.

Limiting Fossil Fuel Subsidies: Fossil fuel subsidies are rarely mentioned in existing RTAs and when they are, the language is typically soft and "best endeavour" in tone. Future RTAs could include more tangible commitments for Parties to limit or eliminate fossil fuel subsidies and act as a platform to help build global consensus on the need to reduce subsidies (Economist Intelligence Unit, 2019).

Asia-Pacific countries should be aware of this changing landscape and (1) proactively assess and prepare for the impacts of the transition to climate smart trade and (2) consider the position they will take in future RTA negotiations.

E. CONCLUSION

This chapter reviewed the extent to which RTAs, including economic partnership agreements, featured provisions that could make trade and investment more climate smart. While an increasing number of RTAs feature climate relevant provisions, much remains to be done to ensure that RTAs effectively support trade and climate change concerns. To the extent possible, climate-related provisions should specify more precise, measurable and binding commitments. RTAs should also incorporate credible mechanisms for the enforcement of these provisions.

Including commitments in RTAs to reduce tariff and non-tariff barriers to trade on environmental goods and services is a good starting point, expanding the list of goods whose liberalization can lead to significant climate benefits. This could include goods not currently included in the list of environmental goods agreed by APEC in 2012, such as certain hydropower-related goods. Particular attention may also be placed on trade in services related to climate change, as they play an important role in complementing trade in environmental goods related to climate change. In addition, RTAs may incorporate binding commitments on environmentally harmful subsidies, including fossil fuel subsidies.

Importantly, as mentioned earlier, climate-related provisions in RTAs should take into account the level of development of trade partners. Developing countries should be offered adequate technical and financial support to assist with the negotiation and implementation of such provisions, leveraging existing regional platforms or developing new ones to raise awareness about the importance of climate smart trade and the role of RTAs and building the necessary capacity to design, implement and enforce new climate-related provisions.

REFERENCES

Abman, Ryan, Clark Lundberg, and Michele Ruta (2021). The effectiveness of environmental provisions in regional trade *agreements.* Policy Research Working Paper; No. 9601. Washington, D.C.: World Bank, Washington, D.C.: World Bank.

Allee, Todd, and Andrew Lugg (2016) Who wrote the rules for the Trans-Pacific Partnership? *Research & Politics*. 26 July.

Baghdadi, Leila, Immaculada Martinez-Zarzoso, and Habib Zitouna, (2013) Are RTA agreements with, environmental provisions reducing emissions? *Journal of International Economics*, vol. 90, No. 2, pp. 378–390.

Bastiaens, Ida, and Evgeny Postnikov (2014). Environmental provisions in EU and US trade agreements and regulatory change in the developing world. Available at https://www.peio.me/wp-content/uploads/PEIO8/Bastiaens,%20Postnikov%2029.09.2014.pdf.

_____ (2017). Greening up: the effects of environmental standards in EU and US trade agreements, *Environmental Politics*, vol. 26, No. 5, pp. 847–869.

Berger Axel, and others (2020) Towards greening trade? Environmental provisions in emerging markets' preferential trade agreements. In *Sustainability Standards and Global Governa*nce, Achanna: Negi, Jorge Pérez-Pineda, and Johannes Blankenbach, eds., Singapore: Springer.

Brandi, Clara, and others (2020). Do environmental provisions in trade agreements make exports from developing countries greener? *World Development*, vol. 129.

_____ , Dominque Bruhn, and Jean-Frédéric Morin (2019). When international treaties matter for domestic environmental legislation? *Global Environmental Politics*, vol. 19, No. 4, pp. 14–44.

Deere Birkbeck, Carolyn (2021). *Greening International Trade: Pathways Forward.* Geneva: Global Governance Centre and the Forum on Trade, Environment and the SDGs (TESS).

Economist Intelligence Unit (2019). Climate change and trade agreements: friends or foes? Available at https://iccwbo.org/content/uploads/sites/3/2019/03/icc-report-trade-and-climate-change.pdf.

European Union (2021). Short overview of the Regional Comprehensive Economic Partnership (RCEP). Directorate-General for External Relations. Briefing. Available at https://www.europarl.europa.eu/committees/en/short-overview-of-the-regional-comprehen/product-details/20210301CAN59942.

Frey, Christopher (2015). Mega-regional trade agreements and post-2014 climate protection: bridging the gap. *Journal of European Environmental and Planning Law*, vol. 12/3–4, pp. 264–285.

George, Clive (2014). Environment and regional trade agreements: emerging trends and policy drivers. OECD Trade and Environment Working Papers, No. 2014/02, Paris: OECD Publishing.

Jinnah, Sikina, and Abby Lindsay (2016). Diffusion through issue linkage: environmental norms in US trade agreements. *Global Environmental Politics*, vol. 6, No. 3, pp. 41–61.

_____ , and Elisa Morgera (2013). Environmental provisions in American and EU free trade agreements: a preliminary comparison and research agenda, *Review of European, Comparative and International Environmental Law*, vol. 22, No. 3. pp. 324–339.

Kolcava, Dennis, Quynh Nguyen, and Thomas Bernauer (2019). Does trade liberalization lead to environmental burden shifting in the global economy? *Ecological Economics*, vol. 163, pp. 98–112.

Lamy, Pascal, Geneviève Pons, and Pierre Leturcq (2020a). Greening EU Trade 4: How to "green" trade agreements. Jacques Delor Institute Policy paper, November 2020. Available at https://institutdelors.eu/en/publications/greening-eu-trade-4-how-to-green-trade-agreements/.

_____ (2020b). Greening EU trade 3: a European border carbon adjustment proposal. Jacques Delor Institute Policy paper, No. June 2020. Available at https://institutdelors.eu/wp-content/uploads/2020/06/A-European-Border-Carbon-Adjustment-proposal_EN.pdf.

Martínez-Zarzoso, Immaculada, and Walid Oueslati (2016). Do deep and comprehensive regional trade agreements helping to n? International Environmental Agreements: Politics, Law and Economics, vol. 18, pp. 743–777.

Monteiro, J., and J. Trachtman (2020). Environmental laws. In *Handbook of Deep Trade Agreements*, Aaditya Mattoo Nadia Rocha, and Michele Ruta, eds. Washington, D.C: World Bank.

Monteiro, José-Antonio (2016). Typology of environment-related provisions in regional trade agreements. WTO Working Paper ERSD-2016-13. Available at https://www.wto.org/english/res_e/reser_e/ersd201613_e.pdf.

Morin, Jean Frédéric, Sikina and Jinnah (2018). The untapped potential of regional trade agreements for climate governance, *Environmental Politics*, vol. 27, No. 3, pp. 541–565.

_____ , Joost Pauwelyn, and James Hollway (2017). The trade regime as a complex adaptive system: exploration and exploitation of environmental norms in trade agreements. *Journal of International Economic Law*, vol. 20, No. 2, pp. 365–390.

Organisation for Economic Co-operation and Development (OECD) (2007), *Environment and Regional Trade Agreements*. Paris: OECD Publications.

Petri, Peter, and Michael Plummer (2020). RCEP: a new trade agreement that will shape global economics and politics. Brookings Institute, 20 November. Available at https://www.brookings.edu/blog/order-from-chaos/2020/11/16/rcep-a-new-trade-agreement-that-will-shape-global-economics-and-politics/.

United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2020). Asia-Pacific trade and investment trends 2020/2021. Available at https://www.unescap.org/sites/default/d8files/knowledge-products/APTIT%20PTA%2024%20Dec.pdf.

United Nations Environment Programme (UNEP) and International Institute for Sustainable Development (IISD) (2016). Sustainability Toolkit for Negotiators. Available at https://cf.iisd.net/toolkits/sustainability-toolkit-for-trade-negotiators/.

van Asselt, Harro, Nicolien van der Grijp, and Frans. Oosterhuis (2006), Greener public purchasing: opportunities for climate-friendly government procurement under WTO and EU rules. *Climate Policy*, vol. 6, No. 2, pp. 217–229.

Yamaguchi, Shunta (2020). Greening regional trade agreements on investment, OECD Trade and Environment Working Papers, No. 2020/03. Paris: OECD Publishing.

Zhou, Li, Xi Tian, and Zhen-qi Zhou (2017). The effects of environmental provisions in RTAs on PM2. 5 air pollution. *Applied Economics*, vol. 49, No. 26, pp. 2630–2641.

CHAPTER

Climate-smart trade and transport facilitation

Trade and transport facilitation have long been acknowledged as key components of a strategy to channel trade and investment towards sustainable development (ESCAP, 2017). As noted in chapter 2, streamlining trade-related procedures is an important way through which the impact of trade transactions on the environment and climate change can be reduced. New technologies to digitalize and automate trade and transport are becoming key enablers of a transition towards cleaner supply chains by improving efficiency and optimizing existing processes, while also creating new business opportunities (UNCTAD, 2019).

This chapter examines the impact of trade procedures and transport-related activities on the environment and climate change in more details, focusing on how advancing the digitalization of trade and promoting sustainable and seamless transport can reduce environmental externalities and support sustainable development. Sections A to C focus on trade facilitation, while Sections D and E consider transport facilitation more specifically. Section F concludes.

A. TRADE FACILITATION: REGULATORY FRAMEWORKS AND EMERGING TRENDS

The objective of trade facilitation is to expedite the movement, release and clearance of goods by ensuring trade procedures are transparent and simplified, harmonized and standardized. Trade facilitation can boost imports and exports and ease by reducing red tape and cutting related costs estimated to total 15 per cent of the prices of goods (UNCTAD, 2016).

Successful trade facilitation necessitates the modernization of institutions and processes. Though more challenging to implement for some countries, especially least developed countries, modernization through automation and the introduction of new technologies helps streamline procedures. Combined with greater transparency, modernization makes supply chains more resilient, efficient – and, also often greener; it promotes good governance.

"The global baseline for trade facilitation is provided by the WTO Trade Facilitation Agreement, which makes no reference to the environment or climate change."

The WTO Trade Facilitation Agreement (TFA), adopted in 2014, provides a binding multilateral framework for implementation by Governments of a set of specific trade facilitation measures, building on earlier recommendations and protocols of UN/CEFACT, UNCTAD and the World Customs Organization (WCO). By facilitating trade transactions for the business community, Governments create a win-win situation in which savings from cutting red tape makes the private sector more competitive and at the same time improves revenue collection, regulatory compliance and the formalization of trade. A study conducted by WTO in the lead up to the adoption of the TFA projected a savings in global trade costs of approximately 14.3 per cent, potentially leading to an increase of 35 per cent in export volumes for developing countries after the Agreement is fully implemented (WTO, 2017b). Nevertheless, no reference is made to the environment or climate change in the legal text of the Agreement.

Trade facilitation has long been a priority for countries in Asia and the Pacific, as they strive to fully leverage international trade as an engine of development. It has also been a key element of most RTAs in the region, which often feature WTO TFA "plus" provisions. For example, ASEAN signed the ASEAN Single Window Agreement in 2005, which authorizes the establishment of a regional electronic trade single window system. The Pacific Agreement on Closer Economic Relations (PACER Plus), which involves Australia, New Zealand and nine Pacific islands economies[1] also addresses trade facilitation through the lenses of (a) transparency with an increasing access to information and publications on trade-related procedures and (b) customs cooperation based on the modernization of customs processes and regional supply chains.

Most recently, RCEP,[2] signed in November 2020, also promotes trade facilitation based on automation and connectivity with the view to increasing transparency of trade data and supply-chain efficiency. Again, however, this and most other RTAs generally do not recognize the link between trade facilitation and its impact on climate change or the environment (see chapter 4).

The relation between trade facilitation and climate change is arguably not evident, hence the failure to mention it in international and regional trade agreements. Trade facilitation, as explained above, is expected to increase trade volumes (through the scale effect, discussed in chapter 1) and accordingly lead to more pollution linked to transport and use of carbon-intensive inputs to carry out procedures, such as paper used in administrative formalities and fuel for transport needed to meet physically with regulatory agencies, electricity, etc.

"In addition to boosting trade, trade facilitation can also help mitigate the negative impacts on climate by making the trade transaction process less carbon intensive."

However, in addition to boosting trade, trade facilitation can also help mitigate the negative impacts on climate by reducing carbon emissions associated with individual international trade transactions. This can be done by, for example,

[1] Cook Islands; Kiribati; Nauru, Niue; Samoa; Solomon Islands; Vanuatu; Tonga; Tuvalu.
[2] Brunei Darussalam; Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Philippines; Singapore; Thailand; and Viet Nam, and Australia; China; Japan; New Zealand; Republic of Korea.

recognizing electronic documents and reducing the use of paper in regulatory compliance procedures and ensuring that these procedures are completed using renewable energy solutions. By reducing trade costs, it is also possible that production takes place where it causes fewer emissions (through a change in the composition effect, discussed in chapter 1). For example, rather than using nationally produced tomatoes (under glass, with heating and other emissions) or nationally produced coal (with energy-intensive extraction methods), simpler trade procedures could encourage the import of tomatoes from countries with more sunshine, or coal from countries with less energy-intensive extraction.

"Because e-commerce and the COVID-19 crisis are spurring a surge in shipments of small parcels across borders, reducing carbon emissions associated with trade procedures has become even more important."

Taking a closer look at the impact of trade – and transport – procedures on carbon emissions will become increasingly important as trade is increasingly done through e-commerce platforms, which has resulted in a surge in the number of transactions, and small parcels jamming customs clearance systems at the borders. The COVID-19 crisis has further accelerated this trend (box 5.1).

As discussed further in the next section, implementing climate-smart trade facilitation measures can also help make trade more resilient. During the COVID-19 pandemic, countries with the highest degree of automation and technology in trade facilitation operations have managed better than those with less advanced trade and customs clearance processes. Paperless trade measures have been especially helpful during the pandemic. Strong evidence suggests that such measures can also help mitigate the impact of trade on climate change.

Box 5.1

The COVID-19 crisis and e-commerce

E-commerce has been growing exponentially over the past ten years. This was made possible through massive investment in technology over the past two decades. For example, global Internet protocol traffic rose from 100 gigabytes (GB) per day in 1992 to up to 46,600 GB per second in 2017. While most online shoppers mainly buy from domestic suppliers, some 277 million people made a cross-border purchase in 2017, and interest in buying from foreign suppliers is increasing. The share of cross-border online shoppers in total online shoppers rose from 15 per cent in 2015 to 21 per cent in 2017. This growth can be attributed to a significant increase in United States shoppers buying from foreign suppliers (UNCTAD, 2019a).

Yet, a digital divide still excludes a great part of the poorest countries, even though solutions, such as mobile money, have surged in the developing and least developed countries.

During the COVID-19 crisis, the global lockdowns and travel restrictions have accelerated considerably the demand for e-commerce, increasing pressure on the express couriers to supply the world market. It is estimated that the share of e-commerce in global retail increased from 14 per cent to 17 per cent from 2019 to 2020. E-commerce relies on trade facilitation by fast-tracking customs clearance procedures as prescribed by the WTO TFA Article 7.8 on Expedited Shipments. By implementing procedures for expedited shipments, Governments facilitate the expedited release of goods that enter through air cargo facilities to persons who apply for such treatment, while maintaining customs control.

Expedited e-commerce, however, has led to an increase in CO2 emissions through the increase in air and urban transportation, propelled by the surging demand for fast-tracking the last mile delivery by express couriers. According to the World Economic Forum, e-commerce last mile delivery could increase CO2 emissions by 30 per cent by 2030 without effective intervention (WEF, 2020). To counter this development, some measures can be taken, such as using electric vehicles for the delivery of parcels and incentivizing customers to protect the environment by clustering purchases and pricing next-day delivery.

B. TRADE FACILITATION SOLUTIONS TOWARDS GREENING TRADE PROCEDURES

Trade facilitation can lead to tangible results by reducing, *inter alia*, the use of paper and the time spent, and petrol and electric energy consumed while communicating with border agencies to meet administrative requirements. This can be measured in a reduction of GHG emissions. Trade facilitation through new technologies combined with national policies aimed to promote greening trade, can contribute to what UNCTAD refers to as "trade-climate readiness, i.e., enhance the resilience of their trade to climate change through adaptation actions and economic diversification" (UNCTAD, 2021).

Reviewing the WTO TFA provisions through trade facilitation – the environment nexus helps to further understand the link to climate change and supply chain resilience. Among these provisions, several articles, such as Article 1 on Transparency and Publication, Article 10.1 on Formalities and Documentation Requirements, Article 10.4 on Single Window and Article 7.2 on Electronic Payment, among others, are strong recommendations to modernize agencies responsible for border controls and trade procedures by implementing smart technologies in the clearance process.

"Full and digital implementation of the WTO TFA provisions can support climate-smart trade."

Some other measures aimed at reducing, simplifying and streamlining the number of procedures (Articles 1 and 8), reduce the number of forms and papers required to complete trade procedure. Article 7.1 on Pre-Arrival Processing allows for the submission of the cargo declaration data to the relevant authorities prior to the arrival of the goods. This is linked to Article 7.4 on Risk Management, which facilitates the screening carried out by the customs authorities of the consignments entering a national territory according to the associated level of risk. These provisions reduce the time goods, transport workers and agents spend at the border.

These provisions not only increase the level of predictability, security and transparency, they also reduce the time and costs associated with each procedure and the emissions resulting from the use of paper and energy in the supply chain. Indeed, submitting a declaration online through an electronic single window cuts the time spent to meet the regulatory requirements, hence eliminating paper-based formalities and the fuel required to drive to visit the agencies and meet physically with the public officers. Accordingly, while the WTO TFA may not have been drawn up with the intention to directly target climate change mitigation strategies, it still provides a useful framework in support of climate-smart trade by encouraging modernization of the public service delivery related to trade and logistics supply chains.

The ever-increasing range of new technologies has changed the state of play in the trade sector and increased the use of modern IT operating systems. To date, 93.3 per cent of the signatories of the WTO TFA have ratified it. This illustrates that Governments ardently support the common goal to facilitate trade processes towards efficiency and modernization, and by doing so, to contribute to a climate-smart trade.[3] To ensure that the climate benefits of the Agreement are captured, Asia-Pacific countries must implement provisions digitally and in full. The entry into force of the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific in February 2021 is promising in this regard, as the regional United Nations treaty is entirely dedicated to accelerating the digitalization of trade procedures.[4]

1. Evidence from customs modernization and automation

The facilitation of trade procedures is to a large extent associated with the modernization and automation of the customs processes. As ESCAP (2018) shows, lack of coordination of regulatory controls and inspections from control authorities at borders and the weakness of electronic information systems are among the most challenging issues in the railways border crossing on Asian networks. The development of automated IT software in the clearance of goods

[3] See the World Trade Organization Trade Facilitation Agreement Database. Available at https://tfadatabase.org/state-of-play/.
[4] The Framework Agreement entered into force after China and Bangladesh completed ratification during the last quarter of 2020. For more information, see ESCAP (2020).

has resulted in a greater level of predictability, security and management of goods at borders by reducing the time and costs of clearance processes. This trend has provided new possibilities with the introduction of the electronic single windows for trade. The 2019 United Nation Global Survey on Trade Facilitation and Paperless Trade indicates that nearly 60 per cent of the economies had engaged to some extent in creating an electronic single window for processing trade documents.[5]

The United Nations Conference on Trade and Development, through its Automated System for Customs Data (ASYCUDA) Programme has assisted more than 90 countries in digitalizing their trade facilitation processes since 1981. ASYCUDA is a computerized customs management system that enables an automated customs clearance process of most foreign trade procedures. It plays a key role in supporting countries' efforts to mobilize domestic revenue through implementing trade facilitation policies, efficient procedures and regional integration, while building capacity, and safeguarding natural resources. From ASYCUDA, then ASYCUDA++, ASYCUDA World, UNCTAD helps Governments build electronic single windows using ASYCUDA infrastructure. To date, 96 countries, including 20 in the Asia-Pacific region, use ASYCUDA at different levels of implementation (UNCTAD, 2020a). The section below includes a discussion on the cases of Vanuatu and Timor-Leste and the impact of automated customs processes on the reduction in time and costs of trade procedures on the reduction in paper-based formalities and the fuel emissions produced by the number of trips to visit border agencies for each procedure:

Vanuatu electronic single window: the electronic single window project started in 2019. From only two procedures, the sanitary and phytosanitary (SPS) certificate application process and the cargo clearance process, the reduction in paper documents is down by respectively 95 per cent and 100 per cent and the number of trips required to comply with the procedural requirements are lower by 86 and 100 per cent lower, respectively. Box 5.2 presents details of these calculations.

Box 5.2

The case of the Vanuatu electronic single window

The elimination of paper-based formalities and trips is presented as two procedures automated through the electronic single window of Vanuatu.

Sanitary and phytosanitary (SPS) certificate application process:

BEFORE: From January to December 2019, prior to automation, 9,728 applications for SPS certificates were lodged with biosecurity:

- For each application, there are seven paper documents produced/printed: the applicant would fill out one page of application and attach one page of supporting document and then would receive in return one page of the SPS certificate + three attachments (conditions) and one page of payment receipt.
- The above represented 9,728 x 7 = 68,096 pages of paper document printed (excluding any photocopies that the applicant would make).
- Prior to automation, applicants also had to lodge their applications physically to the nearest biosecurity office. The applicants would need to make about three trips: one to submit the application, one to make the payment, and one to collect the SPS certificates and attachments.
- The above represented 9,728 x 3 = 29,184 trips to the biosecurity office, excluding any follow-ups or submission of additional documentation.

[5] See https://unnext.unescap.org/content/un-global-survey-digital-and-sustainable-trade-facilitation.

Box 5.2 *(continued)*

AFTER: Following the implementation of the ASYCUDA SPS Module (ASYSPS) in March 2020, 4,535 SPS certificates were approved from March to December 2020:

- All documents are submitted electronically and SPS certificates and attachments are sent back to the applicant as PDF files.
- Because of the low uptake of e-payment, applicants prefer to make the payments manually, except for some companies that have a deferred payment arrangement with biosecurity. Consequently, this did not lead to the total elimination of paper documents in which an average of 4,000 pages of receipts were printed out, representing close to a 95 per cent reduction in the use of paper documents for the SPS application process.
- Payments were made at the biosecurity offices so an estimated 4,000 trips were made to make the payment, a reduction of approximately 86 per cent as compared to 2019.

Cargo clearance process: Vanuatu Customs Department has been using electronic customs declarations and supporting documents since migrating to ASYCUDA World in 2017. When customs formalities are completed, the declarants then need to also clear their consignments with the biosecurity department. The data below represent information gathered only from the largest customs office in Vanuatu (Port Vila seaport).

BEFORE: From January to December 2019, prior to automation, 8,489 customs declarations required biosecurity intervention.

- To get their goods cleared by biosecurity, the declarants needed to submit a copy of the customs declaration, bill of lading, packing list, SPS certificate and import permit averaging five pages of paper documents.
- The above represented 8,489 x 5 = 42,445 pages of documents to submit to biosecurity for clearance.
- The declarant was also required to physically submit the documents to the biosecurity office, collect the results or arrange for inspection, and make payments, averaging three trips.
- The above represented 8,489 x 3 = 25,467 trips.

AFTER: Following the implementation of the ASYCUDA Administration Selectivity in 2020 to harmonize the risk profiling and targeting of customs and biosecurity, the biosecurity department was provided access to ASYCUDA World and used the electronic customs declaration and attached scanned documents submitted by declarants.

- Under the above procedure, no paper document was required for clearance, representing a 100 per cent reduction in use of paper.

The implementation of Administration Selectivity enabled the declarants to know if their consignments would require inspection by the customs department, the biosecurity department or both at the time of validation. No trips were made as an arrangement for inspection. If required, inspection was conducted by email or phone, representing a 100 per cent reduction in vehicle use for this process.

Source: Vanuatu Single Window National Project Team.

Timor-Leste ASYCUDA World: Since the implementation of ASYCUDA World in Timor-Leste, several procedures have been automated, which has resulted in a reduction of the number of pages required for the completion of the procedures: the electronic manifest submission is down from three copies to one copy. In 2020, the number of manifests submitted was 1,324, averaging 150 pages per manifest, which resulted in a savings of 198,000 pages in 2020; the elimination of a receipt printout (the ASYCUDA World system generates a PDF-formatted receipt automatically and dispatches an electronic mail to importers and declarants with proof of payment), which saved 38,032 pages (19,016 receipts composed of two copies of one page) in 2020; and the uploading of paper copies of business credentials documents, such as business registration licences and tax debt to lodging single administrative documents are no longer submitted on paper, resulting in a savings of 28,920 pages since January 2018.

> *"The electronic single window in Vanuatu has reduced CO2 emissions by 5,827 kg by eliminating the use of papers in two automated trade procedures."*

To calculate the impact of such reductions of papers in the GHG emissions, some measurement tools from ESCAP[6] indicate that one printed page equals 54.7 g of CO2 emissions. Similar results are indicated pertaining to the pollution emitted by cars though the equivalence requires more information on the distance, type of cars and fuel used (diesel or patrol) to fulfil the regulatory procedures. When converted into the CO2 emissions, the electronic single window in Vanuatu has reduced these emissions by 5,827 kg by eliminating the use of paper in two trade procedures automated only. In Timor-Leste, ASYCUDA World has allowed for a reduction of 14,492 kg of CO2 emissions since it was launched. These two country cases show the great impact of digitalization on CO2 emissions. In addition, the use of fuel and other related energy costs should be included in the calculations with a view to arriving at a more precise and complete measurement of the impact of trade facilitation on GHG emissions. When these are taken into account, Duval and Hardy (2021) find that each single end-to-end trade transaction fully undertaken digitally could save emissions equivalent to planting 1.5 trees. For the Asia-Pacific region, this implies savings of approximately 13 million tonnes of CO2e annually, equivalent to the carbon absorbed by 400 million trees.

2. Evidence from transparency and information

During the COVID-19 crisis, the need for online information has been accentuated with Governments needing to communicate emergency guidelines and decisions, and with the trade community requiring access to information to ensure smooth continuity of business. Transparency has been key in managing the crisis and was achieved thanks to innovations in information and communication technologies (ICTs). Transparency increases trade by enhancing predictability and compliance and allows for sound decision-making processes for any trader willing to engage in a trade deal while reducing paper when published through online platforms.

As part of the implementation of the WTO TFA Article 1.2 on Information Available through the Internet, UNCTAD has developed the Trade Information Portal (TIP) methodology and technology and assists Governments in publicizing and documenting trade procedures for export and import products.[7] The UNCTAD TIPs are online step-by-step guides to trade-related procedures. To date, 29 TIPs, based on UNCTAD technology, are being implemented globally by UNCTAD or ITC. The objective of the UNCTAD TIP is twofold: increase transparency on the rules and procedures and provide practical and up-to-date descriptions of each step to go through from the user's point of view; and document steps and procedures to help identify further ways to simplify and streamline the trade procedures.

The following is an example of a TIP implementation in the Asia-Pacific region, where several TIPs are built on this model. Under the PACER Plus Agreement, there are nine TIPs in the Pacific islands States[8]

[6] See Duval and Hardy (2020).
[7] https://businessfacilitation.org.
[8] Cook Islands, Kiribati, Nauru, Niue, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

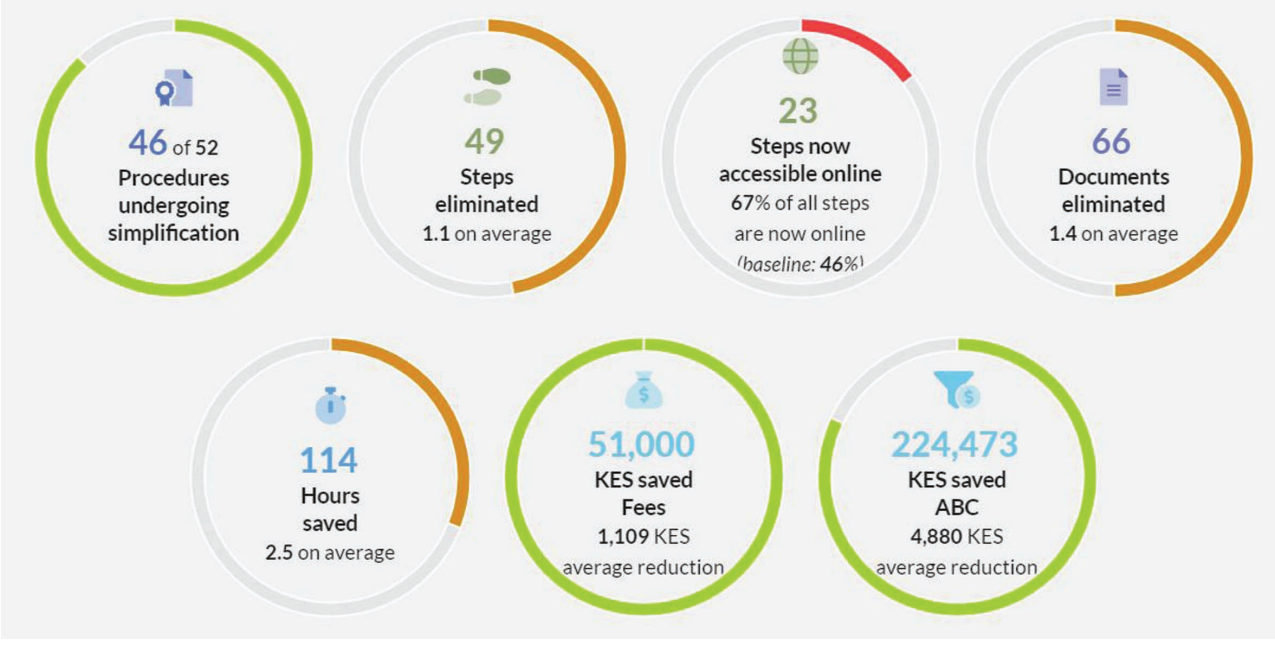
with, in total, more than 250 trade procedures documented. During the first half of 2021, 4,916 visits were made to the Pacific TIPs. This contributes to the reduction in the use of paper and number of trips. In countries where the UNCTAD TIPs are more established, such as in Kenya, the number of monthly visits can reach more than 37,000 visits quarterly.[9]

Once documented online through TIP, a procedure can be corrected, duplications can be eliminated and all irrelevant steps due to out-of-date practices removed. The simplification of processes involves institutions from the public and private sectors, supervised by National Trade Facilitation Committees (NTFCs). Simplification in East Africa[10] shows successful results, as presented in figure 5.1. Simplification in Kenya has led to simplification of 46 trade procedures, elimination of 64 documents and saved 114 hours in total.

"Trade Information Portals are efficient tools to increase transparency and reduce energy consumption in the process to complete administrative trade requirements."

The UNCTAD TIPs include a module to calculate the administrative burden cost savings represented by each simplification. Thanks to the administrative burden module, it is possible to estimate the amount reduced to complete one procedure. In Kenya, a total of 224,473 Kenyan shillings (K sh) ($2,000) has been reduced from simplification of trade formalities. As such, TIPs are efficient tools to increase transparency and reduce energy consumption in the process to complete administrative trade requirements, illustrating their impact not only in terms of competitiveness, but also in greening the supply chains.

Figure 5.1 **Key Performance Indicators of Kenya Trade Information Portal**



Source: Key Performance indicators as captured by the Kenya Simplification Dashboard (available from https://infotradekenya.go.ke/menu/744) (accessed 22 September 2021).

[9] Kenya Trade Information Portal See https://infotradekenya.go.ke.
[10] UNCTAD Trade Facilitation Project in the EAC region, funded by TradeMark East Africa.

C. NEW DEMANDS FOR TRADE FACILITATION RESULTING FROM TRADE POLICIES AND DECARBONIZATION MEASURES

New policies and regulations are being developed to reduce GHG emissions. These policies affect trade and transport; they will also lead to new demands for border agencies to ensure that new regulations are being complied with. For example, in future, ships may need to comply with new International Maritime Organization (IMO) regulations on GHG emissions from shipping to reduce their carbon intensity by 40 per cent compared to their 2008 level across the global shipping fleet by 2030 (box 5.3) and, port and maritime authorities would need to introduce ways to monitor compliance, albeit with as little interference and bureaucracy as possible (IMO, n.d.).

Another example is the European Green Deal, namely the "EU's new growth strategy which facilitates resetting our economic policy to better correspond to the challenges of the 21st century. Its overarching objective is the transition towards a climate neutral, environmentally sustainable, resource efficient and resilient economy by 2050, with the ambition to reduce GHG emissions by at least 55 per cent by 2030 as well as the protection, conservation and enhancement of the EU's natural capital. As such, it [..] will have a strong bearing on trade patterns" (European Commission, 2021).

The European Green Deal entails the adoption of a carbon-border adjustment mechanism to green

Box 5.3

Assessing potential impacts of IMO standards for shipping decarbonization on future demand for transport: findings from UNCTAD research

In 2018, IMO adopted a strategy to reduce CO2 emissions by 50 per cent, as compared to 2008 levels, to make the sector reduction pathway consistent with the goals of the Paris Agreement. Its objectives are the following: (a) reduce total annual GHG emissions by at least 50 per cent by 2050 compared with 2008 levels; and (b) decrease the sector's average carbon intensity by at least 40 per cent until 2030, and 70 per cent by 2050. These objectives are to be achieved through quantitative reduction targets through 2050 and a combination of short-term, mid-term and long-term policy measures to help achieve the targets.

Short-term measures are to be agreed upon between 2018 and 2023. At the end of 2020, UNCTAD was mandated by IMO to conduct a comprehensive impact assessment of the short-term measures approved at the seventy-fifth session of the Maritime Environment Protection Committee, held remotely from 16 to 21 November 2020, namely a new energy efficiency standard for existing ships (the Energy Efficiency Existing Ship Index) and a new operational requirement (the Carbon Intensity Indicator, CII).

Although the impacts may vary depending on countries' specificities and scenarios, the study indicates that the IMO measure could translate into the following:

- *Potential changes to ship costs, ship travel distance, fleet distribution, routing patterns and connectivity patterns*. The impact of sailing speed reduction and potential for service reconfiguration is more apparent in the case of Pacific and Caribbean small island developing States, where short-sea shipping and the use of general cargo ships are more prevalent.
- *Increases in maritime logistics costs* (ranging from 1.6 to 7.6 per cent), although for some trades, a reduction in costs and time at sea are possible, potentially affecting transit times. Increased logistics costs may induce changes in the direction of trade, modal shifts and supply chain reconfigurations.
- *Changes in trade flows*, potentially affecting some developing country exporters, depending on their trading profile and trade values; small island developing States and least developed countries most likely experience the largest declines.

Source: UNCTAD (2021a).

trade based on tariffs associated with the carbon content of imports into the European Union territory – discussed in detail in chapter 6. As such, Governments are under greater pressure to fast-track the streamlining of trade facilitation procedures at borders. Indeed, the border adjustment mechanism would require a new procedure related to the control, inspection and clearance of goods through the creation of a new certificate to certify the carbon content of imported goods. In addition to the risk of creating diversion of trade and exclusion of countries without the capacity to meet the European Union requirements from the European Union markets, another issue involves terms of feasibility of such a mechanism to be implemented by border agencies of developing countries and least developed countries. Discussions are also being held in the United States on the implementation of a levy on carbon-intensive imports from countries that fail to meet their climate and environmental obligations.

"Coordination and innovation are necessary at the global level to require GHG emission reductions fairly while contributing to global prosperity and the COVID-19 recovery process."

As a result, technology will be even more helpful and solutions, such as blockchain, may be of great interest to trace and verify the authenticity of the declarations provided by traders and then be used to determine the carbon levies to be collected at borders. To achieve such noble objectives, coordination and innovation is necessary at the global level to reduce in a fair manner GHG emissions while contributing to global prosperity and the COVID-19 recovery process.

D. DEMAND FOR INTERNATIONAL TRANSPORT SERVICES

Making transport climate-smart entails mitigating its impact on climate change and reducing its vulnerability to climate change. The following sections focus on the negative impact of cross-border freight transport on climate change and policies to reduce this impact.

1. Long-term growing demand for transport services and rising emissions

Demand for international transport services comes from trade. This demand has been growing since the Second World War, reflecting the rapid development of manufacturing trade and development of global value chains. Between 1970 and 2020, global exports increased 55-fold in current prices, reaching $17.6 trillion.[11] An important part of the increased trade occurs intraregionally (UNCTAD, 2020), which covers shorter distances and may imply less GHG emissions than for overseas trade, although the emissions also depend on the mode of transport used. For instance, in 2019, road transport accounted for 20 per cent of freight transport activity, but represented 65 per cent of freight transport emissions, whereas maritime transport accounted for more than 70 per cent of freight movements, but represented 20 per cent of all freight transport emissions (ITF, 2021).

In parallel to contributing significantly towards economic and social development, and trade, transport, as a major consumer of oil, is a significant contributor to global carbon emissions and air pollution. The transport sector accounted for approximately 14 per cent of global GHG emissions, on average, over the past decade; road transport traditionally accounted for three quarters of transport emissions (UNEP, 2020). Passenger road vehicles accounted for the highest proportion of transport emissions, followed by road freight vehicles, aviation and shipping (IEA, 2019).

"Emissions from freight transport are estimated to have accounted for 42 per cent of all transport-related CO2 emissions in 2019, including domestic and international freight."

Emissions from freight transport are estimated to have accounted for 42 per cent of all transport-related CO2 emissions in 2019, including domestic and international freight. International freight volumes are expected to more than double by 2050

[11] UNCTAD, trade statistics, See https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=101 and https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=184185.

(ITF, 2021). Among all regions, Asia and the Pacific recorded the highest level of CO2 emissions associated with import and export-related freight transport in 2015. This is due to its central role in global value chains. Freight transport activity is expected to increase significantly in the region by 2050. According to the International Transport Forum (ITF) estimates, nearly half of the surface freight activity may be concentrated in Asia by then on the back of a significant increase in import-related transport movements. The extent to which future freight activity will be reflected in emission patterns depends on various factors, including, among them, the existing modal split, the pace of investments (for instance, on fleet renewal) and the harnessing and deploying new technologies.

Emissions from international transport, however, only reflect part of the carbon footprint of global trade. Production methods, storage and disposal methods are also factors related to the carbon footprint of traded goods (WTO, 2017a). Methodological nuances (import versus export emissions, territorial versus consumption emissions) are also relevant to the carbon footprint of trade, depending, on the production and trading profile of a country (Ritchie, 2019; Hausfather, 2017). The carbon footprint from international transport increases significantly if, besides transport operations, production processes associated with the manufacturing of machinery, electronics and transport equipment are accounted for (Hummels and others, 2019).

The transport sector has been subject to a wave of environmentally driven regulations. Prominent examples are regulations aimed at bringing aviation and shipping within the scope of the Paris Agreement targets and regional regulations, such as the European regulation requiring companies to monitor and report on CO2 emissions and verify compliance with this regulation for maritime transport activities performed in the European Economic Area. These new regulations are likely to have an impact on future demand for transport, as explained in box 5.3, which summarizes findings from recent UNCTAD research.

Lessons learned from the COVID-19 pandemic: impact on transport emissions and the need for structural reforms.

The pandemic has highlighted the interconnected nature of economies and the importance of transport and trade facilitation in ensuring the supply of essential goods and medical equipment where borders have at times been closed and ports and border posts congested with traffic jams.

The COVID-19 crisis led to a reduction in the global energy-related CO2 emissions by 5.8 per cent in 2020, the largest annual decrease in global energy-related CO2 emissions since the Second World War. The reduction in transport CO2 emissions accounted for more than half of this reduction (IEA, 2020). This can be attributed to the slowdown of the global economy, the widespread disruptions in the transport sector and a decline of the global gross domestic product (GDP) by 4.3 per cent and the global trade in goods by 9 per cent in 2020. As the economy recovered during the second half of 2020, the total annual CO2 emissions started rising again. Global emissions were 2 per cent higher in December 2020 than they were in December 2019 (IEA, 2021). At different times in 2020, road transport emissions reached pre-pandemic levels and sometimes surpassed them in some European economies and in China (Wang and others, 2021). This suggests that the reduction in emissions observed in 2020 is not likely to be sustained after the virus is brought under control and the economy gradually recovers.

Considering UNEP estimations of the required reduction in emissions to meet the Paris Agreement goals of limiting long-term temperature rise by, 2.7 per cent annually on average from 2020 for the 2ºC goal and 7.6 per cent for the 1.5ºC goal (UNEP, 2019), the impact of the pandemic on global warming appears negligible. The experience of the COVID-19 pandemic shows the scale of actions needed to tackle climate change and the importance of structural reforms to sustain progress beyond temporary behavioural changes. Accordingly, the current context presents an opportunity to design policies to help foster the post-COVID-19 economic recovery and at the same time, provide stimulus for a low-carbon transition.

E. GREENING TRADE LOGISTICS THROUGH DIGITAL AND SMART TRANSPORT SYSTEMS

1. The Enable-Avoid-Shift-Improve (EASI) framework

Transitioning towards climate-smart transport entails significant changes in transport operations. It is a

hard-to-abate sector because of current transport patterns and it is the least diversified energy end-use sector. The continuous growth of global demand for transport and technical limitations makes it difficult to replace oil-based fuels (De Blas, 2020).

The EASI framework, encompassing Avoid-Shift-Improve measures and the enabling governance environment provides a framework to identify mitigation options when designing transport policy measures (UNCTAD, 2017; Stucki, 2015):

- "*Avoid strategies*" aim to reduce the demand for freight transport that generates externalities. Relevant strategies may include cutting the quantity of cargo carried, the distances travelled, or both, and avoiding or reducing unnecessary freight transport activities and empty mileage.
- "*Shift strategies*" aim to transfer freight transport activities to more energy-efficient and/or environmental-friendly modes. The shift reduces emissions per unit of freight transport activity, such as tonne-kilometre).
- "*Improve strategies*" aim to enhance system performance and cover freight transport infrastructure, services, and operations. "Improve" strategies may include infrastructure design changes, infrastructure development and maintenance, energy intensity reduction across the various freight transport modes, such as increased load factors or fuel efficiency, and any sustainability-driven improvements affecting vehicles, ships, equipment, transport operations, technologies and behaviour, such as changing drivers' behaviour (UNCTAD, 2017).

Beyond green benefits, such as reduced emissions, climate change mitigation strategies offer significant, economic and societal co-benefits. Table 5.1 provides examples of sustainability co-benefits enabled by digital technologies in five maritime logistics business areas.

Areas in maritime logistics where digitalization can bring sustainability benefits

Digitalization area	Rates, booking documentation, legal and customs	Supply chain control/visibility	Ship technology, equipment conditions, schedules, pilots	Port automation and port services coordination	Interface port/ inland transport
Example:	Blockchain-enabled marketplace allows optimizing empty container space by buying and selling unused container space on existing cargo ship routes, such as Cubex.	Blockchain-enabled tracing technology makes it possible to create an immutable chain of custody that follows the fuel, provides evidence of the authenticity and quality of fuels for actionable insights and compliance, such as BunkerTrace.	Sensors on ships enable monitoring vessel performance and emissions. Processed telemetry data enables detecting and reducing the risk of shipwrecks and environmental disasters, such as the Marine Digital Fuel Optimization System.	Automated electric vehicles within the port reduces emissions in the port vicinity, such as in Port of Los Angeles and in Port of Long Beach.	Internet of things enabled solutions enhance collaboration among ports, multimodal transport agents and cities for optimal use of internal and external resources and environmental impact mitigation in ports, such as PIXEL used in the Port of Piraeus, Bordeaux and the Port of Thessalonki.

Table 5.1 *(continued)*

Digitalization area	Rates, booking documentation, legal and customs	Supply chain control/visibility	Ship technology, equipment conditions, schedules, pilots	Port automation and port services coordination	Interface port/ inland transport
"Green" benefits (EASI framework)	• **I**mproves transport system efficiency • **A**voids/reduces the need for transport and empty returns	• **E**nabling pillar/ governance (data facilitates compliance) • **S**hift (Improved safety track record of alternative fuels may encourage scaling up their use)	**I**mproves vehicle and transport system efficiency	**S**hift to more efficient modes of transport (non-motorized transport using alternative energy source)	• **I**mproves transport system efficiency • **E**nabling pillar/ governance (data and integration among actors involved in ports' environmental impacts facilitates critical decision-making)
Other sustainability co-benefits (Triple-bottom Sustainability Framework)	• (**Economic**) improved cost efficiency (reduced incidence of less than full containers in freight forwarding operations) and savings from secure paperless processes	• (**Economic**) Potential reduction of insurance costs (reduced risks regarding non-compliant fuels) • (**Social**) Improved crew safety	• (**Economic**) Resilient transport systems (digitalization enables preventing and reacting timely to transport disruptions)	• (**Economic**) Reduced traffic congestion at the port • (**Social**) Improved workers safety	• (**Economic**) Reduction of operational and infrastructural costs • (**Economic**) Improvement of logistics efficiency • (**Social**) Better integration of the port in the surrounding socioeconomic area

Sources: Elaboration based on various sources: OECD and ITF (2018); ITS for Climate (2019); Marine Digital (n.d.a; n.d.b.); Wingrove (2019); Mc Donald (2020); Lane (2020); Margaronis (2021); Stucki (2015); UNCTAD (2017).

2. Reducing emissions from transport through digital solutions

In addition to the wave of environmentally driven global regulations, other factors are also driving increased sustainability in the transport sector. Standards are emerging in the industry, spurred by the desire of companies to develop a first mover advantage or maintain a competitive edge. For instance, companies are investing large amounts to improve the technical and financial viability of alternative fuels and collaborative platforms across diverse actors in the industry are emerging to support increased uptake and implementation of energy-efficiency measures for shipping (UNCTAD, 2019b).

Digitalization is a force shaping the supply of transport systems. It is pushing the sector to undergo structural change and altering traditional business models. In recent years, different applications and services have emerged, ranging from cargo booking portals and single window platforms to traffic, routes and fleet management optimization applications. Several types of technology are being used to digitalize transport. Among them, machine-to-

machine communication (Internet of things), distributed-ledger technology (blockchain) and artificial intelligence feature prominently, facilitating a shift towards digitalized and automated cargo-related processes.[12]

> *"Companies are investing large amounts to improve the technical and financial viability of alternative fuels and collaborative platforms across diverse actors in the industry are emerging to support increased uptake and implementation of energy-efficiency measures for shipping."*

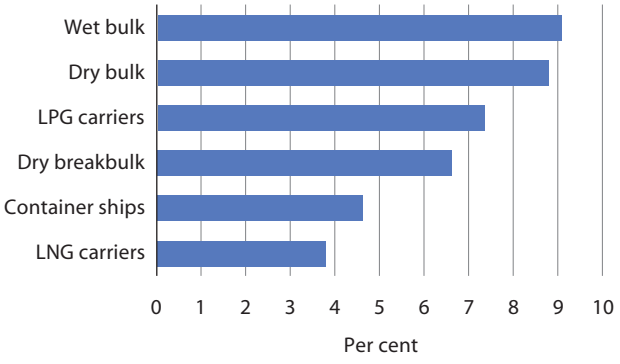
An increasingly data-driven environment and digital solutions are inducing a re-engineering of transport business and operations associated with cross-border trade, moving from (imperfect) collection of data in silos to integrating end-to-end logistics, entailing a systemic approach to process optimization. Enhanced digital information flows exchanged in real time within the transport sector and with a wider spectrum of actors across the supply chain enables – simultaneously – optimization of transport processes, reduced costs and improved efficiency as well as reduced carbon emissions and improved sustainability performances across multiple criteria.

3. Evidence from port call optimization

The Just-in-Time (JIT) port arrival concept illustrates well how digitalization can contribute towards sustainable maritime transport and ports and effectively reduce emissions. The JIT ship arrival concept means that a ship maintains the optimal operating speed to arrive at the port when the berth, fairway and nautical services are all available. This, reduces fuel consumption and waiting time outside the port or anchorages, which reduces GHG emissions and air pollutants in the port vicinity.

Port calls entail significant waiting time at anchorage (figure 5.2). This situation stems from the fact that incoming vessels do not know when the previous ship will leave the berth, which, in turn, depends on knowing when loading, unloading, bunkering, provisioning and other critical services will be completed. Operators and port authorities share very few updates about services availability and

Figure 5.2 **Annual average time at anchorage (percentage, 2018)**



Source: IMO and others (2020).

completion times and ports generally receive information about the arrival of the vessel only about two hours before arrival (IMO, 2021). Sharing updates earlier and more frequently allows an incoming ship to adapt its sailing speed earlier and optimize arrival time (UNCTAD, 2020).

JIT trials conducted in 2020 in the Port of Rotterdam concluded that ships consumed 9 per cent less fuel when speed was optimized in the last 12 hours of the voyage and 8 per cent less for speed optimization in the last 24 hours (Manifold Times, 2020). These results show that significant fuel and emission savings can be achieved through JIT and underline the importance of information exchange in the optimization of a port call.

By enhancing information exchange, digitalization leverages more efficient collaboration, synchronizing the ship's plan for arriving to the port and the port's capabilities of serving the ship. A wide range of port call optimization solutions and projects have emerged and are either in the pilot phase or fully implemented (Intelligent Cargo Systems, 2019). JIT arrival can be challenging to implement, as it involves many stakeholders. Issues around data quality and data exchange feature prominently among operational barriers to implement it (IMO, 2020).

The JIT concept is being implemented in several European countries in connection with the optimization of port operations. The European Union Commission is seeking to expand it to the corridor level through

[12] Some of these digital solutions, notably blockchain, lead to GHG emissions. See, for example, UNCTAD (2021a).

several pilot projects (UNCTAD, 2020). Ongoing efforts, under the FEDERATED and FENIX initiatives, are developing a common architecture for data-sharing among a wider base of logistic operators in Europe. In Asia, Singapore is implementing a Just-in-Time concept under the SESAME Straits e-navigation Test Bed Project (Sesame Straits e-navigation Intelligent Vessel Traffic Management, n.d.). In addition to enabling JIT arrival, this project also seeks to reduce traffic and improve safety for navigation in congested waterways, such as the Straits of Malacca and Singapore.

4. Reducing emissions from transport through digital solutions in Asia

Asian countries have increasingly been deploying smart transport technologies to improve overall transport efficiency and sustainability in recent years (ESCAP, 2019). Box 5.4 presents policies implemented by Singapore since 2011 related to a long-term shipping decarbonization strategy.

Regional approaches play an important role in shifting towards more sustainable and resilient transport systems and in leveraging digitalization for this purpose, as they make it possible to address fundamental issues in a coordinated manner. For instance, regional harmonization of transport-related legal requirements and technical and operational standards are key to facilitate regional transport connectivity and intermodal integration across key trading corridors. A regional approach to digitalize transport systems can also minimize or prevent the interoperability issues and additional costs and threats arising from diverging technical and operational standards.

Box 5.4

Maritime Singapore Green initiative

The Maritime Singapore Green initiative was launched in 2011 by the Maritime and Port Authority of Singapore, with the objective to reduce the environmental impact of shipping. Consultations are ongoing to draft the maritime Singapore decarbonization blueprint 2050, which is intended to define long-term strategies for this industry.

These initiatives strive to prepare the ground for ensuring the future competitiveness of Singapore as a global leader in several maritime services in a carbon-constrained future and alignment of practices with the initial GHG strategy adopted by IMO in 2018.

The Green Initiative, launched in 2011, provided a series of regulatory incentives, such as tax rebates and reduced port dues for ships registered in Singapore (that adopt energy-efficiency standards, such as EEDI requirements or use low-carbon fuels). It also includes port dues rebates for ships using bunkering services in Singapore for liquified natural gas. It also foresaw pilot trials in green technologies and capacity-building initiatives in carbon accounting and carbon pricing to develop capabilities in advanced sustainability reporting. The initiative has led to collaborative ventures with carriers to fund research and development projects to reduce GHG emissions.

The 2050 strategy aims to position Singapore as a research centre for decarbonization solutions for ships and infrastructure. Ongoing discussions foresee the development of clusters, scaling up of financing (developing further partnership with carriers and introducing a mandatory levy to fund research and explore zero-carbon fuels) and, promoting harmonized standards for carbon accounting and the development innovative technologies and solutions. Among these, smart ports encompassing automation and electrification feature prominently.

Sources: Straits Times (2021); Maritime and Port Authority of Singapore (2021); Singapore Business (2021); National Climate Change Secretariat Strategy Group, Prime Minister's Office (2019).

"A regional approach to digitalize transport systems can also minimize or prevent the interoperability issues and additional costs and threats arising from diverging technical and operational standards."

Digitalizing transport networks for more sustainable and resilient transport systems become even more pronounced in the Asia-Pacific regional policymaking agenda, as a result of the COVID-19 crisis (ESCAP, 2020a; 2020b). For example, ASEAN regional recovery guidelines has identified digitalized and smart solutions as a priority to shift towards sustainable transport. These solutions encompass route optimization, remote monitoring of transport operations and network traffic management (to avoid congestion), simplified transport procedures (to reduce waiting time and delays), and electronic platforms enabling greater collaboration among freight operators, including facilitating modal shifts for increased resilience of freight movement (ASEAN Secretariat, 2021).

Prerequisites to advance towards maximizing sectoral digitalization benefits in the region include investing in infrastructure (for instance, retrofitting existing transport infrastructure to adapt to digitalization of transport procedures and bridging digital asymmetries among different countries in the region), enhancing regional collaboration for data standards (to ensure harmonized electronic exchange of data in digital transport corridors and border crossings); strengthening regulatory frameworks to address concerns about data protection and cybersecurity; and developing capacity of operators for transport and logistics digitalization (ASEAN Secretariat, 2021, ESCAP, 2021a; 2021b) Box 5.5 illustrates the case of the Trans-Asian Railway Network.

These experiences show the crucial role of policies and measures to encourage technology adoption and digitalization, including investment in the path to promote more sustainable transport operations and more specifically decarbonizing transport systems. Partnerships within the industry among carriers and

Box 5.5

Digital solutions for enhanced resilience and sustainable railway transport along the Trans-Asian Railway Network

Since 2014, freight movements through container trains have increased exponentially between Asia and Europe, one of the most important trade routes on the globe. This is due to the development of new railway routes, construction of railway infrastructure, expansion of railway services, and new alliances to serve more markets on the international railway corridors along the Trans-Asian Railway Network.

Investments, policy incentives and strategies enabling these developments stem from the interest of countries along the Trans-Asian Railway Network to enhance the reliability of operations and promote more environmentally sustainable modes of transport. Digitalization is crucial to achieve these objectives. Large railways in the region, such as those in China, India and the Russian Federation, have digitalized many aspects of their railway operations since 2019. Countries in the region have engaged in projects to adopt diverse railway network technologies, including automation, blockchain and e-seals.

The use of rail in the region has increased during the COVID-19 pandemic to compensate for interruptions in road transport operations. Freight transport has proceeded with limited interruptions along the Trans-Asian Railway Network, proving its resilience. This suggests a high potential for greater use of rail in recovery strategies and in strategies to cope with similar disruptions in the future, which could lead to enhancing intermodal operations and achieving a more balanced and sustainable modal split of freight transport in the region.

Achieving this requires improving competitiveness of the railway network. including by scaling up smart solutions, harmonizing electronic information exchange and deepening digitalization of landlocked and least developed countries in the region.

Sources: ESCAP (2020b); (2021a); (2021b).

shippers and regulatory incentives are also important enablers.

F. CONCLUSION

The facilitation of trade and transport plays an important role in the transition towards climate-smart trade. The linkages between trade and transport facilitation, on the one hand, and GHG emissions, on the other hand, are threefold:

- First, making processes more efficient reduces emissions associated with printing, waiting, and unnecessary procedures in trade. Trade and transport facilitation, therefore, has a direct positive impact on reducing emissions.
- Second, however, by facilitating international trade and transport, more goods will be traded requiring transport, which – with other conditions remaining the same – would result in additional emissions from ships, airplanes, and trucks. At the same time, by improving the efficiency of transport operations, emissions can be significantly reduced.
- Finally, trade and transport facilitation will lead to further trade and economic growth. This could lead to additional emissions during the production process. However, it also allows for a more efficient global allocation of resources, including the location of production where renewable energy is cheapest, potentially leading to a global reduction of emissions. This aspect of the potential impact of trade and transport facilitation on emissions is beyond the scope of this chapter, but needs to be kept in mind by policymakers.

International freight transport emissions represent almost half of total transport emissions. They are growing rapidly and are expected to more than double by 2050. This is of particular concern to Asia, which could account for nearly half of the surface freight activity by 2050.

Emerging environmental regulations could also affect future transport demand. Recent research from UNCTAD in connection with potential impacts of the short-term decarbonization measures adopted at IMO shows potential impacts across different variables, with possible increases in maritime logistic costs, leading to changes in the direction of trade, modal shifts and supply chain reconfigurations.

Although the COVID pandemic led to a significant reduction in CO2 emissions during 2020, this reduction is not sufficient to curb emissions in line with the goals of the Paris Agreement. Accordingly, the current context presents an opportunity to design policies aimed at a post-covid economic recovery that, at the same time, provides stimulus for a low-carbon transition.

Changes required to secure long-term transport emissions cuts require decoupling trade growth from emissions. In this sense, new policies aimed at inducing changes in technology, operations, fuel use, and demand in the shipping and aviation sectors are key pieces of this puzzle. Mobilization of resources towards developing countries that have less fiscal leverage is also important.

A lower carbon future requires closer and enhanced collaboration among different actors and sectors. In this context, digitalization offers great potential for enhancing intra and inter-sectoral collaboration to improve the environmental performance of the transport sector and, optimizing transport processes, reduce costs and improving efficiency.

In terms of specific policy recommendations, on a national scale, Governments should ensure the use of green technologies in the automated customs systems, electronic single windows and trade information portals to increase paperless trade procedures. Digital tools and solutions available across the United Nations system can be leveraged to accelerate customs and trade digitalization. There is also need to increase investments in modes of transport that can support high volumes of trade while reducing emissions and by optimizing use of the existing logistics infrastructure. The energy transition, such as supporting zero-emission technologies and transport infrastructure, should be encouraged along with reducing incentives for high-carbon technology and projects. Finally, it is essential to invest in human, institutional and technological capacities so that traders and service providers can seize new business opportunities related to the digitalization of transport, trade and customs processes, such as blockchain, artificial intelligence and Internet of things.

Regionally, coordination among Governments should be promoted to increase policy coherence in support of innovation in technologies and the transition to renewable energy in trade and transport facilitation, particularly in the context of the COVID-19 recovery. Regional frameworks can be used as a platform to pilot and develop more interoperable and digitalized climate-smart transport systems. Finally, there is need to amend RTAs to include the spillover effects on climate change in reference to trade and transport facilitation, including harmonized regulatory frameworks on data protection and cybersecurity.

As explained in this chapter, the Asia-Pacific region is flexible and agile, as shown by its implementation of green technology at various stages of the supply chain. The COVID-19 crisis has put trade and transport facilitation in the spotlight to keep trade flowing and simultaneously support health and safety. As a result, digital trade and transport facilitation has gained further interest since 2020; digital solutions have led to further improvements in trade efficiency and enhanced regulatory compliance.

Countries need to ensure that they remain competitive and that their trade benefits from improvements that can be achieved through digitalization of transport processes. Policies and measures, based on close cooperation between businesses and the public sector, to encourage technology adoption and digitalization and increased investment will play a crucial role in enhancing the capacity of countries to leverage digitalization for more sustainable trade and transport facilitation operations.

REFERENCES

Brandi Clara, Dominque Bruhn, D. and Jean-Frédéric Morin (2019): When do international treaties matter for domestic environmental legislation? *Global Environmental Politics*, vol. 19, No. 4, pp. 14–44.

de Blas, Ignacio (2020). The limits of transport decarbonization under the current growth paradigm. *Energy Strategy Reviews*, vol. 32.

Duval, Yann, and Simon Hardy (2021). A primer on quantifying the environmental benefits of cross-border paperless trade facilitation. ARTNeT Working Paper Series No. 2016. Bangkok: ESCAP.

European Commission (2021). Trade policy review – An open, sustainable and assertive trade policy. Communication from the Commission to the European Parliament, the Council, the European.

Hausfather, Zeke (2017). Mapped: the world's largest CO'2 importers and exporters. Carbon Brief, 5 July. Available at https://www.carbonbrief.org/mapped-worlds-largest-co2-importers-exporters.

Hummels, David, and others (2011). Trade and the greenhouse gas emissions from international freight transport. NBER Working Paper Series. Available at https://www.nber.org/system/files/working_papers/w17117/w17117.pdf.

International Energy Agency (IEA) (2019). Transport sector CO2 emissions by mode in the Sustainable. 22 Development Scenario, 2000–2030. 22 November. Available at https://www.iea.org/data-and-statistics/charts/transport-sector-co2-emissions-by-mode-in-the-sustainable-development-scenario-2000-2030.

_____ (2020). Global energy review: understanding the impacts of Covid-19 on global CO2 emissions. Available at https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020.

_____ (2021). After steep decline in early 2020, global carbon emissions have rebounded strongly. Press release, 2 March 2021. Available at https://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly After steep decline in early 2020, global carbon emissions have rebounded strongly.

IMO (2021). Ship-port interface guide – practical measures to reduce GHG emissions. Available at https://greenvoyage2050.imo.org/wp-content/uploads/2021/03/Ship-Port-Interface-Guide-compressed.pdf.

_____ (n.d.). Initial IMO GHG Strategy Available at https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx.

_____, and others (2020). Just-in-Time arrival guide: barriers and potential solutions. Available at https://greenvoyage2050.imo.org/wp-content/uploads/2021/01/GIA-just-in-time-hires.pdf.

Intelligent Cargo Systems (2019). 2019 guide to port call optimization. Available at https://static1.squarespace.com/static/5f99ee8b5f20943e0537b23a/t/5fa186a637c48c30bfdddb77/1604421292033/2019-ICS-PCO-Guide.pdf.

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

Lane, Katrina (2020). Blockchain-enabled marketplace optimises empty cargo space, Springwise, 4 September. Available at https://www.springwise.com/sustainability-innovation/mobility-transport/cubex-global-marketplace-recovery-ocean-freight.

Manifold Times (2020). 'Just in Time' arrival trial reports 8-9% bunker fuel savings by cutting vessel idle time. 15 December. Available at https://www.manifoldtimes.com/news/just-in-time-arrival-trial-reports-8-9-bunker-fuel-savings-by-cutting-vessel-idle-time/.

Margaronis, Stas (2021). Ports of LA and Long Beach: Can clean air action plan revolutionize port operations? Ajot Port and Terminal Insights, 18 February. Available at https://ajot.com/insights/full/ports-of-la-and-long-beach-can-clean-air-action-plan-revolutionize-port-operations.

Marine Digital (n.d.a) Fuel optimization system and vessel performance monitoring. Available at https://marine-digital.com/fueloptimizationsystem.

_____ (n.d.b). Reducing greenhouse gas emissions: decarbonization and sustainable energy in maritime. Available at https://marine-digital.com/article_decarbonization.

Maritime and Port Authority of Singapore (n.d.). Maritime Singapore Green Initiative enhanced leaflet. Available at https://www.mpa.gov.sg/web/portal/home/maritime-singapore/green-efforts/maritime-singapore-green-initiative.

McDonald, Deanna (2020). 2020 compliance and bunker fuel issues solved, using blockchain and DNA. The Loadstar, 3 September. Available at https://theloadstar.com/2020-compliance-and-bunker-fuel-issues-solved-using-blockchain-and-dna/.

Ritchie, Hannah (2019). How do CO2 emissions compare when we adjust for trade? Our World in Data, 7 October. Available at https://ourworldindata.org/consumption-based-co2.

Sesame Straits e-navigation Intelligent Vessel Traffic Management (n.d.). Then a brief overview of the SESAME Straits e-Navigation Test Bed Project. Available at http://straits-stms.com/Project.html.

Singapore Business (2021). Here are nine strategies Singapore could use to decarbonise the maritime industry, 22 April. Available at https://sbr.com.sg/shipping-marine/news/here-are-nine-strategies-singapore-could-use-decarbonise-martime-industry Maritime.

StraitsTimes (2021). Maritime Singapore taking steps towards a greener maritime industry, 4 May. Available at https://www.straitstimes.com/singapore/environment/maritime-singapore-taking-steps-towards-a-greener-maritime-industry 2021.

Stucki, Martin (2015). Policies for sustainable accessibility and mobility in Africa. Sub-Saharan Africa Transport Policy Program (SSATP), No. 106. Washtington, D.C.: World Bank.

United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2017). *Asia-Pacific Trade and Investment Report 2017: Channelling Trade and Investment into Sustainable Development.* United Nations publication, Sales No. E.II.22.

_____ (2018). Study on border crossing practices in international railway transport. Available at https://www.unescap.org/sites/default/d8files/knowledge-products/Study%20on%20Railway%20Border%20crossings%2046218.pdf.

_____ (2019). Using smart transport technologies to mitigate greenhouse gas emissions from the transport sector in Asia and the Pacific. Available at https://www.unescap.org/sites/default/d8files/knowledge-products/UsingSmartTransportTechnologies_July2021.pdf.

_____ (2020a). Transport connectivity for efficient and resilient supply chains. Note from the secretariat. Committee on Transport, sixth session, Bangkok, 12–13 November (ESCAP/CTR/2020/2).

_____ (2020b). Seamless trade and transport connectivity in Asia and the Pacific: regional cooperation in the context of the COVD-19 pandemic. Policy brief. Available at https://www.unescap.org/sites/default/d8files/knowledge-products/TIID_TD_Seamless%20Transport%20and%20Trade%20Connectivity-Final.pdf.

_____ (2021a). Smart railway solutions for Trans-Asian Railway Network in the times of COVID-19 pandemic, Report, 14 May. Available at https://www.unescap.org/kp/2021/smart-railway-solutions-trans-asian-railway-network-times-covid-19-pandemic.

_____ (2021b). Strengthening freight transport corridors in the aftermath of COVID-19. Policy brief, 15 May. Available at https://www.unescap.org/resources/unescap-sswa-policy-briefs-6-strengthening-freight-transport-corridors-south-asia.

United Nations Environment Programme (UNEP) (2019). *Emissions Gap Report 2019*. Nairobi: UNEP.

_____ (2020). Emissions Gap Report 2020. Nairobi: UNEP.

United Nation Conference on Trade and Development (UNCTAD) (2016). Trade Facilitation and Development, driving trade competitiveness, border agency effectiveness and strengthened governance. Transport and Trade facilitation Series No.7. Available at https://unctad.org/webflyer/trade-facilitation-and-development-driving-trade-competitiveness-border-agency.

_____ (2019a). Digital Economy Report, 2019 – Value Creation and Capture: Implications for Developing Countries. United Nations sales publication, No. E.19.II.D.17.

_____ (2019b). Digitalization in maritime transport: ensuring opportunities for development, Policy Brief No. 75. Available at https://unctad.org/webflyer/digitalization-maritime-transport-ensuring-opportunities-development.

_____ (2019c). Review of maritime transport 2019. Available at https://unctad.org/system/files/official-document/rmt2019_en.pdf.

_____ (2020a). Compendium 2020, ASYCUDA partnerships for Sustainable Development. Available at https://unctad.org/system/files/official-document/dtlasycuda2021d1_en.pdf.

_____ (2020b). Digitalizing the port call process, Transport and Trade Facilitation Series 13. Available at https://unctad.org/webflyer/digitalizing-port-call-process.

_____ (2020c). Handbook on statistics. Available at https://unctad.org/system/files/official-document/tdstat45_en.pdf.

_____ (2021a). *UNCTAD Assessment of the Impact of the IMO Short-Term GHG Reduction Measure on States*. Geneva: UNCTAD.

_____ (2021b). Harnessing the promise of blockchain to change lives, 2 March. Available at https://unctad.org/news/harnessing-promise-blockchain-change-lives.

Wang, Yiling, and others (2021). Transportation CO2 emissions stay high despite recurrent COVID outbreaks. Available at https://arxiv.org/ftp/arxiv/papers/2101/2101.06450.pdf.

Win, Thin (2019). 'Buying local' groceries isn't always better for the environment. Thomson Reuters Foundation, 24 September. Available at https://www.reuters.com/article/global-food-trade-idINL5N26E5W1.

Wingrove Martyn (2019). Blockchain's impact on shipping and insurance, Riviera Maritime News, 20 September. Available at https://www.rivieramm.com/news-content-hub/news-content-hub/blockchainrsquos-impact-on-shipping-and-insurance-56256 2019.

World Economic Forum (WEF) (2020). Urban deliveries expected to add 11 minutes to daily commute and increase carbon emissions by 30% until 2030 without effective intervention, 10 January. Available at https://www.weforum.org/press/2020/01/urban-deliveries-expected-to-add-11-minutes-to-daily-commute-and-increase-carbon-emissions-by-30-until-2030-without-effective-intervention-e3141b32fa/.

World Trade Organization (WTO) (2017a). The impact of trade opening on climate change https://www.wto.org/english/tratop_e/envir_e/climate_impact_e.htm.

_____ (2017b). WTO press conference – Entry into force of trade facilitation agreement, remarks by DG Azvedèdo. 22 February, Available at https://www.wto.org/english/news_e/spra_e/spra157_e.htm.

CHAPTER

Estimating the impact of a switch to climate-smart trade and investment

Previous chapters included discussions on the links between trade, investment and climate change, together with various trade and investment policies that could help address climate change. As advocated throughout this report, a good regulatory principles approach strongly suggests that any proposed policies should be subject to rigorous *ex-ante* sustainability impact assessments. As such, this chapter aims to evaluate the potential macroeconomic impacts of various policies to decarbonize and mitigate the climate impact of trade and investment. In addition, it has a discussion on trade-related climate policies implemented outside of the Asia-Pacific region that may significantly affect traders in the region.

A range of trade-related climate-smart policies are covered in the chapter, including carbon pricing policies, carbon border tax adjustments (BTAs) and removal of fossil fuel subsidies. Alternative policy scenarios were developed to explore the potential impacts of these types of policies using computable general equilibrium (CGE) analysis. In addition to the impact on CO2 emissions, macroeconomic impacts are estimated, together with some

analysis of the sectoral impacts, including movement of labour between sectors. The results highlight some of the economic costs associated with various policy options. Accordingly, it is important to consider the costs of these climate-smart policies against potential costs of inaction, which is overviewed briefly in the following section.

A. THE COSTS OF CLIMATE INACTION

As discussed in the subsequent sections, tackling climate change, including through climate-smart trade and investment, comes with a significant price tag for the global economy. The costs of inaction, however, are estimated to be orders of magnitude greater. This section contains a summary of how existing literature has "put a price on climate change" and the potential consequences and costs of inaction against climate change.

"Tackling climate change through climate-smart trade and investment comes with a significant price tag for the global economy. The costs of inaction, however, are estimated to be orders of magnitude greater."

The comprehensive report, *Climate Change 1995 Economic and Social Dimensions of Climate Change* of IPCC summarizes the scope of climate change for policymakers (Bruce, Lee and Haites, 1996). It includes estimated damage costs in key industries in the global economy, such as agriculture, health, migration and pollutants. The authors estimate that a 2.5°C warming results in climate change costs ranging between 1.5 and 2.0 per cent of world GDP, 1 and 1.5 per cent of developed countries GDP, and importantly, 2 and 9 per cent of developing countries GDP, averaged across multiple sectors. They emphasised that the damages would be more severe in developing countries, finding that the average costs of inaction for developing countries would be 50 per cent higher than the average costs for OECD members. Ackerman and Stanton (2008) also emphasise that the costs of inaction would lead to a reduction in global GDP, and that developing countries would suffer far greater damages. In particular, countries with fewer resources face the greatest consequences under a business-as-usual economy scenario. Difficulty in estimating the costs of climate change lies in the difficulty of measuring and valuating the loss of human lives and health, extinction of species and ecosystems, and increased social conflicts, along with other, more direct effects of global warming (Ackerman and Stanton, 2008).

Yi-Ming and others (2020) find that failure to meet climate targets set out in the Paris Agreement will result in global costs between $150 trillion and $792 trillion by 2100. Assuming a rise of 2°C, they conclude that the estimated net benefit from acting against climate change falls between $127 trillion and $616 trillion by 2100. The economic benefit is premised on improving the understanding of climate change damages and innovation in climate mitigation technologies.[1] OECD (2021) estimates that without mitigation by 2070, coastal cities will experience major effects and that an estimated $35 trillion of urban assets could be at risk without action. Without intervention, precipitation patterns and flooding catastrophes will increase, especially in areas of China and the Americas, causing projected costs of between $7 billion and $1.8 trillion by 2080. Water stressed areas in North Africa, India, Central Asia, and the Middle East will worsen and the average number of people living with medium and severe water stress will increase from three billion to more than five billion by 2050 without climate action. On average, the economic costs of these effects will negatively affect GDP in all countries by between 0.5 and 4 per cent by 2060, most significantly in the Middle East and North Africa, sub-Saharan Africa, and South and South-East Asia (OECD, 2021). These regions include some of the poorest and most vulnerable populations, who are likely to suffer a lot from the impacts of climate change.

"The costs of inaction are estimated to be as high as 4 per cent of annual regional GDP by 2060, or $792 trillion by 2100 if the Paris Agreement targets are not met."

Overall, recent studies generally point to higher overall costs of inaction that are estimated to be as high as 4 per cent of annual regional GDP by 2060,

[1] Yi-Ming and others (2020) argue that the long-run benefits of climate change mitigation far outweigh the short and long-run costs of mitigation. Climate change abatement costs lead to negative net-income effects in the short run for all countries; however, if this results in refusal to implement extreme climate change mitigation policy, it will make it more difficult to mitigate and lead to higher long run costs.

or $792 trillion by 2100 if the Paris Agreement targets are not met. Action is required, and while immediate costs may be high, the estimated net long-term benefits of climate mitigation far outweigh the estimated economic and social costs.

B. POLICIES TO REDUCE CARBON EMISSIONS

As noted at the outset of this report, the primary goal of policies addressing climate change is to reduce GHG emissions. Some related policies set a price on GHG emissions, either directly or indirectly, most commonly by targeting carbon emissions created by burning of fossil fuels (World Bank, n.d.). Examples include abolishment of harmful fossil fuel subsides, reducing barriers to trade in environmental goods and services, and removing inefficiencies associated with transport and cross-border trade formalities through trade facilitation and most carbon pricing policies. Governments have a few options when introducing carbon pricing policies, however, the main goal is to capture externality costs and link them to their sources of carbon emission.

"The primary goal of policies addressing climate change is to reduce GHG emissions."

When discussions for international environmental cooperation began around 1980, developed countries recognized that domestic carbon policies could adversely affect their economic growth and international competitiveness; however, developing nations voiced greater concerns that international carbon policies would affect their economic development priorities, poverty alleviation and trading relationships (Flannery and others, 2020). Recognition of the specific needs of developing countries are incorporated into the United Nations Framework Convention on Climate Change (UNFCCC, 1992),[2] to take into account their potential increased vulnerability.

1. Eliminating fossil fuel subsidies

"Eliminating fossil fuel subsidies would achieve multiple objectives, namely a reduction in government expenditure, more efficient allocation of resources and assistance to efforts aimed at tackling GHG emissions."

As noted earlier, Asia-Pacific economies spent more than $175 billion on fossil fuel subsidies in 2019. Eliminating fossil fuel subsidies would achieve multiple objectives, namely a reduction in government expenditure, more efficient allocation of resources and assistance to efforts aimed at tackling GHG emissions. One estimate suggests that "even a partial phase-out of fossil fuel subsidies would generate 12 per cent of the total reduction needed by 2020 to achieve the 2°C target" (IEA, 2013).[3]

2. Carbon pricing

Two common carbon pricing policies are implemented by Governments: emission trading schemes and carbon taxes. Both aim to internalize the costs associated with carbon emissions, with the goal to incentivize a reduction in emissions. Often referred to as a cap-and-trade system, emission trading schemes cap the total GHG emissions in an economy, allowing low-emission producing industries to sell their surplus quota to high emission producers, creating a capped marketplace for carbon (World Bank, n.d.).

"A carbon tax sets a price directly on the GHG emissions, creating financial incentives to lower emissions and encourage investment in innovative clean energy and efficient production infrastructure."

A carbon tax, on the other hand, sets a price directly on the carbon content of fossil fuels, requiring

[2] "3.5. The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade."

[3] This research modelled the possible impacts by 2025 of policy changes across 26 countries. It found that removing subsidies to fossil fuels could reduce emissions by an average of 6 per cent across the countries modelled. The reform could reduce average emissions by up to an additional 13.2 per cent by 2030 – if combined with a 10 per cent energy tax from 2025 until 2030, along with investing 30 per cent of the savings into clean energy.

a payment per tonne for carbon emissions, creating financial incentives to lower emissions and encourage investment into innovative clean energy and efficient production infrastructure (Carbon Pricing Leadership Coalition, n.d.). Figure 6.1 shows implemented and planned carbon pricing schemes in the Asia-Pacific region. As of June 2021, approximately 21.5 per cent of global GHG emissions were covered by some sort of pricing initiative; the global average price was estimated at $2/tCO2 (World Bank, 2021). In comparison, according to estimates, carbon prices need to be at least $50–$100/tCO2 by 2030 to cost-effectively reduce emissions in line with the temperature goals of the Paris Agreement (Carbon Pricing Leadership Coalition, 2017). Current prices vary widely from less than $1 to more than $100. Importantly, though less discussed, is the coverage of emissions. For example, the Japanese scheme covers more than 75 per cent of total emissions, whereas existing state-level schemes in the United States cover only 5 per cent of the country's emissions.

Current and planned carbon pricing schemes in Asia and the Pacific

Name of the initiative	Economy	Type
Brunei Darussalam undecided	Brunei Darussalam	Undecided
Beijing pilot ETS	China	ETS
China national ETS	China	ETS
Chongqing pilot ETS	China	ETS
Fujian pilot ETS	China	ETS
Guangdong pilot ETS	China	ETS
Hubei pilot ETS	China	ETS
Shanghai pilot ETS	China	ETS
Shenyang pilot ETS	China	ETS
Shenzhen pilot ETS	China	ETS
Tianjin pilot ETS	China	ETS
Indonesia ETS	Indonesia	ETS
Japan carbon pricing mechanism	Japan	ETS
Japan carbon tax	Japan	Carbon tax
Saitama ETS	Japan	ETS
Tokyo CaT	Japan	ETS
Kazakhstan ETS	Kazakhstan	ETS
Korea ETS	Republic of Korea	ETS
New Zealand ETS	New Zealand	ETS
Pakistan ETS	Pakistan	ETS
Sakhalin ETS	Russian Federation	ETS
Singapore carbon tax	Singapore	Carbon tax
Taiwan ETS	Taiwan, Province of China	ETS
Thailand ETS	Thailand	ETS
Turkey ETS	Turkey	ETS
Vietnam ETS	Viet Nam	ETS

Source: World Bank Carbon Pricing Dashboard (https://carbonpricingdashboard.worldbank.org/) (accessed June 2021).

Note: ETS, emission trading scheme. Highlighted rows indicate that the initiative is under consideration.

"If the revenue raised from a carbon pricing scheme is collected effectively and channelled back into the economy, it has the potential to increase the level of economic activity, reduce inequality and poverty and also make progress towards realizing emissions targets and reducing air pollution."

If the revenue raised from a carbon pricing scheme is collected effectively and channelled back into the economy, it has the potential to increase the level of economic activity and reduce inequality and poverty, and also make progress towards realizing emissions targets and reducing air pollution. If, on the other hand, no revenue is generated or recycled, progress towards realizing emissions targets is likely to entail economic and social costs (Weinberger and others, 2021). The policy can be fine-tuned to align with government priorities. For example, spending on social protection more directly affects inequality and poverty; spending on environmental protection also reduces pollution; spending on health improves health outcomes and raises productivity; spending on energy efficiency investment accelerates the decline in emissions; whereas using carbon revenue to pay down debt may be useful if debt is headed on an unsustainable trajectory (Weinberger and others, 2021).

Ideally, as envisaged in Article 6 of the Paris Agreement, the most efficient and cheapest reductions globally would be if economic jurisdictions were able to trade carbon credits across borders. Indeed, such a trading scheme already exists in the European Union. However, due to significant differences in carbon pricing schemes and prices across regions at different levels of development, it is largely unfeasible to implement free trade of carbon credits across all borders at this stage. The consequence of uneven pricing and lack of carbon trade may result in carbon leakage.

Border tax adjustments to address carbon leakage

A potential consequence of carbon pricing policies implemented in one country or region is carbon leakage. Carbon leakage occurs when high emission creating production moves to countries that impose less stringent carbon policies. This may cause overall global emissions to increase, despite a reduction of emissions in the region where the more stringent carbon policies are introduced. To combat carbon leakage, some jurisdictions, such as the European Union (EU),[4] are either discussing or proposing the introduction of carbon border tax adjustments (BTAs), with the aim to reduce the amount of carbon leakage. Carbon BTAs also are intended to deal with the concerns of producers that become less competitive because of domestic carbon pricing if overseas competitors are not similarly taxed.

The proposed European Union Carbon Border Adjustment Mechanism, or CBAM, is the most advanced BTA in terms of planning (box 6.1). There are several pending issues associated with actual implementation of BTAs. First, calculating the correct BTA to apply is not straightforward and various methodologies have been proposed, each with advantages and drawbacks (Burniaux and others, 2013; Zhang and Baranzini, 2004; Dong and Whalley, 2009; Mattoo and others, 2009; Winchester and others, 2011). While energy intensive and trade exposed products may be more easily calculated, because of high levels of knowledge of production methods, assessing carbon content for consumer goods and finished products is believed to be complex and often impractical to calculate (Nedumpara and Pradeep, 2021). Second, BTA implementation needs to ensure it does not violate WTO rules. Arguably, the rules of WTO allow for internal taxes to be "border adjusted", and BTAs do not have to be imposed or rebated directly on products, but may be imposed or rebated on manufactured goods made using the products (Flannery and others, 2020).

"Businesses in developing countries are unlikely to have the resources to respond quickly, so BTAs will likely affect them to a greater degree."

The implementation of BTAs also raises a number of concerns for developing countries, as impact levels depend on the responsiveness and adaptive ability of a country. In general, businesses in developing

[4] The European Union proposes, in its July 2021 package to support climate targets, a CBAM to reduce carbon leakage by equalizing the carbon price between domestic and imported products in key industries. This type of BTA aims to increase climate mitigation efforts that are compatible with WTO (European Commission, 2021).

Box 6.1

The European Union CBAM

The stated goals of the European Union CBAM are the following: to enhance its climate action; to encourage partners to raise their level of ambition; to protect manufacturers from unfair competition; to spur the reshoring of economic activity back to Europe; and to boost its own resources (European Parliament, 2021a). To meet these goals, the CBAM must eventually be applied to all imports into the European Union. The European Union Parliament claims that GATT rules allow a provision for acting in pursuit of interests greater than trade, such as climate change, so, therefore, CBAM is consistent with multilateral trade rules (European Parliament, 2021a). The revenue generated by CBAM will most likely be channelled into the Green Deal, although some of it may be dedicated to the poorest countries and the countries most affected by climate change in the European Union (European Parliament, 2021a or 2021b). The European Parliament supports the introduction of the CBAM if it is compatible with WTO and European Union free trade rules, meaning that it is non-discriminatory and does not restrict international trade (European Parliament, 2021a or 2021b).[5] The European Commission identifies five key issues associated with implementing CBAM, calculating carbon content and verifying it independently, defining and implementing an export rebate or exemption from the CBAM, and circumvention risks.

The current European Union-CBAM proposal is to gradually phase in a system that will initially only apply to selected goods deemed to be at high risk of carbon leakage: iron and steel, cement, fertilizer, aluminium and electricity generation (European Commission, 2021). The proposed CBAM will cover direct emissions during the production process; consideration of "indirect" emissions, such as those from the electricity used to purchase the good will be given later. Information on embedded emissions must be provided so that importers can purchase CBAM certificates to cover these emissions, with allowances purchased under the European Union ETS market. Emissions must be calculated using a prescribed process that includes appropriate documentation and verification (European Commission, 2021). When reliable data for the exporting country cannot be applied for a type of goods, the default values will be based on the average emission intensity of the worst performing 10 per cent of European Union installations (European Commission, 2021).

countries are unlikely to have the resources to respond quickly, so BTAs will likely affect them to a greater degree. This could disproportionately disadvantage developing countries and lead to increased inequalities. The countries expected to suffer most from BTA implementation are those that have high levels of exports in the sectors that are taxed initially, most likely the high energy/carbon-creating sectors. Agricultural production is a key source of income for developing regions. BTAs placed on agricultural products exported from low-income regions could exacerbate rural poverty (Hasegawa and others, 2018). The likely reduction in exports from developing countries as a result of BTA implementation could also lead to reduced wages and higher unemployment, especially for women (Soprano, 2021). This highlights the need to design BTAs carefully to ensure that harm is not placed disproportionately on developing countries.

3. Impacts of BTA on developing countries in Asia and the Pacific

"The effects of BTAs on developing countries are likely to be greater and more detrimental than on developed countries."

The effects of BTAs on developing countries are likely to be greater and more detrimental than on developed countries (Nedumpara and Pradeep, 2021). The European Union notes that for least developed countries (LDCs), while preferential treatment is typical in other areas of trade policies, it may not be appropriate in the case of CBAM. Other support mechanisms, such as technical assistance or technology transfer, may be more compatible with achieving climate objectives; however, to ease the transition, a gradual phasing in

[5] See Emerson and Moritsch (2021) for further details.

of a CBAM could be considered for LDCs (European Commission, 2021).

In the Asia-Pacific region, the European Union CBAM would encounter a heterogeneous climate protection landscape. China, Japan and the Republic of Korea have already committed to zero carbon targets, while India and Indonesia are thought to be less able to implement such targets (RECAP, 2021). A report on perceptions of stakeholders suggests that Indonesia is not likely to welcome a CBAM due to ongoing conflict over palm exports, and Indian respondents would view the mechanism as being protectionist and discriminatory (RECAP, 2021). The direct impacts of such a mechanism depend on the level of carbon-intensive material exports. For example, Australia would not experience heavy impacts due to its limited volume of carbon-intensive exports to the European Union, while China will be affected more heavily because it exports steel and other high carbon goods to the European Union (RECAP, 2021).

Evidence also indicates that comprehensive GHG-emission reducing policies would have a long-term impact on food security due to indirect price impacts on key agricultural commodities. This, in turn, would affect the ability to reach global zero hunger (Hasegawa and others, 2018). Carbon policies may lead to afforestation and bioenergy plantation expansion, which would compete with food production for resources, potentially increasing food insecurity; however, reduced climate change impacts would improve food security in some regions.

4. Other policies to reduce carbon emissions

Many trade and investment policies that could help reduce carbon emissions are identified in earlier chapters. Chief among them is the liberalization of trade in climate-smart and environmental goods to facilitate and promote access and adoption of climate-smart consumption and production. NTMs, such as energy labels on imported goods, also have the potential to reduce carbon emissions.[6] Trade and transport facilitation identified in chapter 5 as being important in reducing carbon emission per transaction or on a per shipment basis, if not in absolute terms, as they may also lead to a further increase in trade volume.[7] CGE simulations of carbon pricing and subsidy removal presented in this chapter do not include these other policies as they require a higher level of data disaggregation and granularity than what is feasible when using CGE analysis – see box 6.2 for a separate partial equilibrium analysis of removing tariffs on environmental goods.

[6] The measures discussed in previous chapters require careful sustainability assessments. They typically have to be conducted on a country-by-country and/or product-by-product basis. For example, consumer choice studies on the effect of energy efficiency labels in China have found that for low-priced products, energy labels do not affect purchasing behaviour; in the Republic of Korea, on the other hand, households expressed willingness to pay more to purchase products providing energy efficiency labels (more so than those with environmental labels).The European Union's energy performance standards and energy labels have substantially increased market shares of cold appliances with high energy labels.

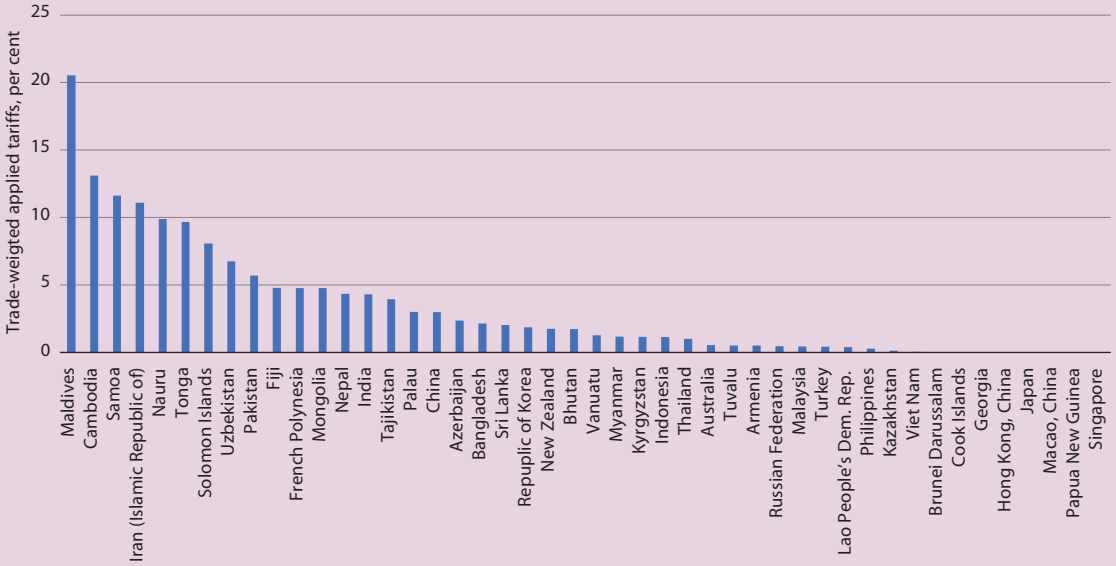
[7] Earlier analysis by ESCAP explored the effects of trade facilitation implementation on trade and trade costs (ESCAP, 2018) as well as environmental and socioeconomic variables (ESCAP, 2017). The results suggest that trade facilitation implementation could reduce trade costs and increase trade and GDP, but they need to be accompanied by complementary policies that address negative spillovers on employment and the environment.

Box 6.2

The impact of removing tariffs on environmental goods in the Asia-Pacific region

Liberalizing trade in environmental goods is a key policy suggestion in the this report. Increasing the availability of these products will facilitate greater technology transfer, enable countries to accelerate their progress towards achieving sustainable development, and, in particular, facilitate climate action. This policy is the cornerstone of the negotiations of the WTO Agreement on Environmental Goods, part of APEC commitments (to keep tariffs under 5 per cent for such goods) and a key pillar of the AACTS agreement negotiations. Figure A shows trade-weighted tariffs imposed on the products in the APEC environmental goods list.[8]

Figure A. Trade-weighted average tariffs facing imports of environmental goods in the Asia-Pacific region, latest years



Source: Authors' calculations based on data from World Bank World Integrates Trade Solution (WITS) (https://wits.worldbank.org/).

"Intraregional liberalization can increase regional imports and exports of these goods by $7.3 billion and $8.0 billion, respectively."

Global CGE models generally model broad sectors, restricting their suitability for analysis that requires the much more granular disaggregation of trade data needed to examine environmental goods. Accordingly, a partial equilibrium modelling analysis was conducted eliminating tariffs imposed on environmental goods by Asia-Pacific regional economies on each other. The results show that intraregional liberalization can increase regional imports and exports of these goods by $7.3 billion and $8.0 billion, respectively. This represents a relative increase of 3.1 per cent and 5.2 per cent of regional imports and exports of environment goods, respectively, in the region.

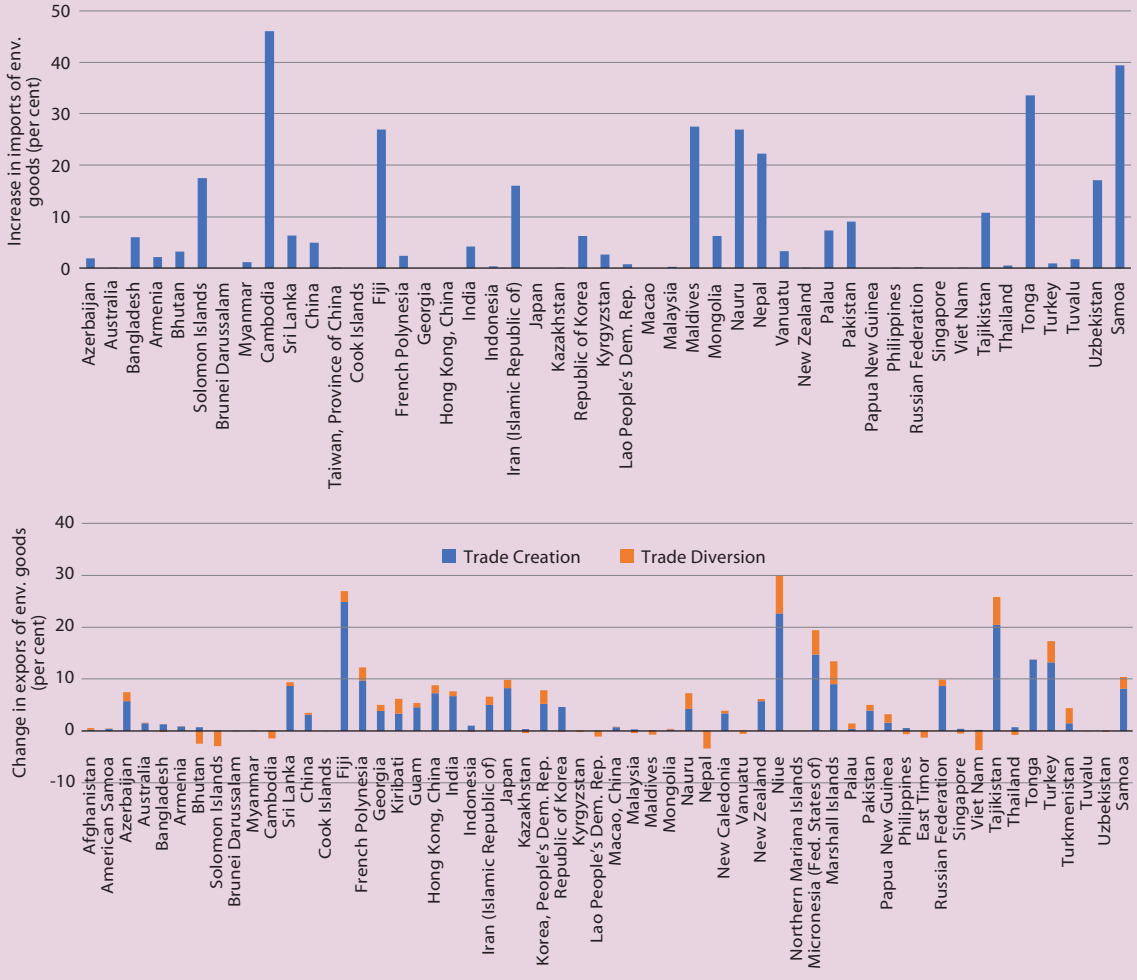
"Governments in the region should accord priority to liberalize trade in environmental goods either unilaterally or by using new and existing trade agreements."

[8] Using the latest trade and tariff data available from World Bank World Integrates Trade Solution (WITS) (https://wits.worldbank.org/).

Box 6.2 *(continued)*

Figure B shows that some regional economies[9] have room to significantly increase their imports of necessary environmental goods through liberalization. Figure A shows that if liberalization is limited to economies in the region alone, intraregional liberalization can significantly boost local exports of environmental goods.[10] Accordingly, Governments in the region should accord priority to liberalize trade in environmental goods either unilaterally or by using new and existing trade agreements.

Figure B. Estimated changes in imports and exports of environmental goods following the removal of intra-Asia-Pacific tariffs



Source: Authors calculations based on data from World Bank World Integrates Trade Solution (WITS) (https://wits.worldbank.org/) Authors' calculations based on World Bank WITS data and elasticities from Utoktham and others (2020).

[9] Roughly correlating to those as showing imposing high tariffs in figure A.

[10] Exports increase more than imports because imports from within the region become relatively cheaper than those from outside of the region, diverting some of the extra-regional imports.

C. CGE SCENARIOS AND SIMULATIONS

To explore potential impacts on the Asia-Pacific region of the implementation of policies to reduce emissions, including carbon border adjustment taxes and subsidy removal, the GTAP-E model is used. This model is based on the well-known Global Trade Analysis Project model (GTAP) (Hertel, 1997; Corong and others, 2017), using the GTAP 10.1 database (Aguiar and others, 2019) extended to include the latest energy version of the GTAP model (Corong and others, 2020).[11] In addition to capturing intersectoral and international linkages within a consistent framework, the GTAP-E model makes it possible to include a relatively detailed specification of energy inputs and associated carbon emissions.[12] While global results are presented to show the impact of various policies, the focus of the analysis is on the Asia-Pacific region, including exploring the differential impacts on real GDP, investment and trade and examining broad sectoral impacts to draw insights into the sectors likely to be most heavily affected by these policies.

1. Simulations

Four key scenarios are modelled. The first one focuses on impacts of carbon prices in place in 2019, the second also includes a stylized version of the CBAM proposed by the European Union, the third models global carbon prices at two different levels, and the fourth scenario models the impact of the elimination of fossil fuel subsidies. The first two scenarios make it possible to consider policies currently in place or planned, the other scenarios explore the impacts of alternative or additional policies that could be considered.

In Scenario 1, existing carbon prices in place globally are modelled to demonstrate the impacts of these prices, including the extent of carbon leakage. For this scenario, the World Bank Carbon Pricing Dashboard[13] is used as a basis to implement carbon prices in place in 2019. Weighted averages of jurisdictions that have multiple schemes in place are used. Table 6.2 contains a summary of the carbon prices modelled. To account for differences in GHG emissions covered, these prices are further weighted according to their emission coverage relative to the European Union+ (EU+) region.[15]

Table 6.2

Carbon prices and emission coverage of carbon pricing schemes implemented, included in scenarios 1 and 2

	Carbon price, 2019 $ (tCO2)	Coverage emissions of 2019 (%)	GHG emissions covered (MTCO2)
EU+	31.18	51	2 091
Ukraine	0.37	73	200
China[14]	4.09	5	588
Japan	2.67	77	911
Kazakhstan	1.16	52	141
Republic of Korea	23.46	65	464
Singapore	3.69	61	40
New Zealand	17.53	50	41
Canada	21.29	69	500
United States	12.11	7	450
Mexico	2.99	25	170
Chile	5.00	48	52
South Africa	7.38	90	463

Source: Authors' calculations based on World Bank data using World Bank Carbon Pricing Dashboard (https://carbonpricingdashboard.worldbank.org/).

Scenario 2 incorporates the same 2019 carbon prices in place as those in Scenario 1, along with implementation of a CBAM by the EU+ region – similar to the mechanism employed by UNCTAD (2021). The CBAM is modelled as tariffs imposed by the EU+ importing region on key sectors.[16] Given carbon prices in place in other regions, adjustments are made under the CBAM so that countries already

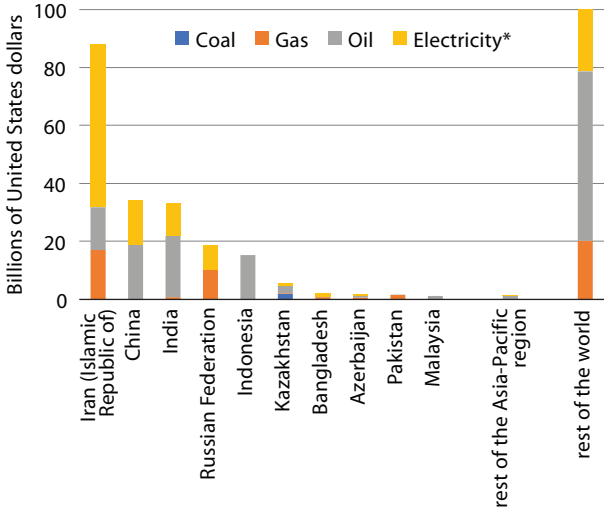
[11] The model is solved using GEMPACK software (Harrison and others, 2014).
[12] See Strutt and others (forthcoming) for details on the modelling framework and data.
[13] See https://carbonpricingdashboard.worldbank.org/.
[14] China has since launched a national ETS, however, at the time of writing this report data on price and share of emissions covered were "not available"?
[15] Comprising the European Union; United Kingdom; Norway; Iceland; Lichtenstein; and Switzerland.
[16] The following sectors are covered in the aggregation: minerals and metals; iron and steel; leather and wood; paper products; chemical, rubber and plastics; electronics; machinery and appliances; and electricity.

implementing a carbon tax only pay the differential tax rate. It is assumed that no adjustments are applied to LDCs.[17]

The third scenario models the impacts of a global carbon tax, with every country in the world charging the same tax. This simulation of all countries imposing the same tax aims to provide insights into the "optimal" case in which no carbon leakage can occur. A global carbon tax rate of $10 (Scenario 3a) and $50 (Scenario 3b) is modelled.

In the fourth scenario, the impacts of removing all 2019 fossil fuel subsidies on intermediate inputs and final consumption of coal, gas, petroleum products and electricity are explored. Fossil fuel subsidies have been reduced somewhat between 2014 and 2019. Some economies imposed no subsidies in 2019 while others imposed heavy subsidies. Figure 6.1 shows all fossil fuel subsidies imposed in the individual countries and subregions modelled. In addition to considerable variation between economies, there is also much variation in the sectoral focus of subsidies: for example, relatively high electricity subsidies are evident in the Islamic Republic of Iran, while subsidies on the petroleum sector are more important for economies, such as China, India and Indonesia and coal subsidies tend to be relatively small for most subregions (figure 6.1).

Figure 6.1 **Fossil fuel subsidies, United States dollars, 2019**



Source: IEA (2021).

Notes: *Subsidies to fossil fuels used to produce electricity.

D. RESULTS

1. Global results

> *"Almost half of the current global reductions in GHG emissions is due to existing carbon pricing schemes within the EU+ region."*

Global impacts of these policies on emissions, economic welfare, real GDP, investment and real exports are first examined; the results are summarized in table 6.3. All the scenarios modelled are expected to reduce global CO2 emissions. Under the first scenario ("implementation of existing carbon prices") emissions decline by just under 2.2 per cent and small further reductions are seen to slightly more than 2.2 per cent with the inclusion of CBAM for the EU+ region. More than 300 MT of CO2 equivalent, or almost half of the reduction in emissions in these scenarios can be attributed to the EU+ region imposing carbon prices; however, implementation of CBAM by EU+ (scenario 2) only reduces emissions by a further 18 MT. The global carbon prices modelled (scenario 3) have a much more significant impact on emissions, reducing global emissions by an estimated 8.4 per cent in the case of a $10 tax and by 26.5 per cent for the $50 carbon tax.

> *"Reducing fossil fuel subsidies, particularly electricity subsidies, reduces global emissions much more than all of the existing carbon pricing schemes."*

Reducing fossil fuel subsidies (scenario 4) reduces global emissions by 3.2 per cent, which demonstrates a more significant impact on emission reduction than all of the existing 2019 carbon pricing schemes. Eliminating gas and electricity subsidies make significantly strong contributions to emission reductions, with each reducing global emissions by more than 1.3 per cent. Eliminating subsidies in the Islamic Republic of Iran alone accounts for close to half of the reduction in global emissions in this

[17] In the aggregation of the GTAP model, this is Rest of the Pacific, Cambodia, Lao People's Democratic Republic, Bangladesh and Rest SSA. However, if included in CBAM, these regions have very little impact on the results.

Table 6.3 **Simulated impacts on global welfare, investment, exports and CO2 emissions, scenarios 1-4**

	Welfare ($m)	Real GDP (%)	Investment (%)	Exports (%)	CO2 (%)	CO2 (MT)
Scenario 1: Existing carbon prices	**-46 039**	**-0.06**	**-0.03**	**-0.26**	**-2.18**	**-685**
due to EU+ carbon prices	-37 552	-0.05	-0.03	-0.26	-0.98	-307
due to China carbon prices	-200	0.00	0.00	0.00	-0.16	-49
due to US carbon prices	-506	0.00	0.01	-0.01	-0.25	-77
Scenario 2: Carbon prices + CBAM	**-45 595**	**-0.06**	**-0.05**	**-0.32**	**-2.24**	**-705**
due to CBAM	340	0.00	-0.02	-0.06	-0.06	-18
Scenario 3a: Global carbon tax $10	**-23 298**	**-0.03**	**-0.06**	**-0.10**	**-8.37**	**-2 631**
Scenario 3b: Global carbon tax $50	**-231 755**	**-0.30**	**-0.56**	**-0.55**	**-26.50**	**-8 330**
Scenario 4: Fuel subsidy elimination	**53 936**	**0.07**	**0.13**	**0.08**	**-3.21**	**-1 010**
due to coal subsidies	393	0.00	0.00	0.00	-0.10	-31
due to gas subsidies	8 927	0.01	0.03	0.05	-1.33	-419
due to petroleum product subsidies	7 614	0.01	0.02	-0.07	-0.34	-106
due to electricity subsidies	37 000	0.05	0.09	0.10	-1.44	-454

Source: Authors' model results.

scenario; China and the Middle East and North Africa region also contribute more than 10 per cent each to the global emission reduction.

"In the absence of significant technological improvements, global carbon prices equivalent to more than the $50, covering at least 50 per cent of global GHG emissions may be required to stay below a 2° degree increase."

It is difficult to translate reductions in emissions into climate change impacts over an extended period of time; however, it may be useful to consider the types of action needed to achieve the objective of staying below 2 degrees warming by 2100. A 2018 IPCC report estimated that to have a two thirds chance of staying below a 2 degree increase, total GHG emissions need to decline by 25 per cent from 2010 to 2030 (Rogelj and others, 2018). Liu and Raftery (2021) suggest that a 31 per cent reduction in fossil fuels and industry CO2 emissions may be required to achieve this goal with a 50 per cent probability of success. In the current study, a baseline forward in time to 2100 is not modelled, therefore, none of the economic and technological changes that may emerge through this timeline are considered. However, the estimates suggest that, in the absence of significant technological improvements, carbon prices equivalent to more than the $50 global carbon tax, ***covering at least 50 per cent of global GHG emissions***,[18] might be is required to stay below a 2° degree increase.

"Removing global subsidies brings a win-win situation with gains in economic welfare, as traditionally measured, accompanying reductions in emissions."

While all of the policies simulated have potential to reduce emissions, results reported in table 6.3 also show some of the costs imposed on the economy. Notably, total global welfare[19] and real GDP declines in all scenarios, with the exception of the final scenario in which fuel subsidies are removed.

[18] Note that the target carbon price could be lowered if the percentage of GHG emissions covered is increased proportionally.
[19] As measured by an equivalent variation in income.

Removing global subsidies brings a win-win situation with gains in economic welfare, as traditionally measured, accompanying reductions in emissions.

The first two scenarios lead to global welfare reductions of $46 billion, while the global carbon prices lead to reductions of approximately 50 per cent of this amount for the $10 tax, but more than five times the amount for the $50 tax. In terms of real GDP, the reduction is 0.06 per cent in the first two scenarios. The most substantial GDP reductions tend to be in economies where there are relatively high carbon taxes, including Canada, 0.3 per cent and the Republic of Korea and the EU+ region, 0.2 per cent. When global carbon prices are imposed, a $10 carbon tax is simulated to reduce global GDP by about 0.03 per cent, increasing to 10 times this in the case of a $50 tax. Notably, however, for fuel subsidy elimination, real GDP is anticipated to increase by approximately 0.07 per cent.

"Global carbon prices are likely to offer a more efficient way to achieve the objective of reducing global emissions than unilateral and patchy country carbon prices."

These results indicate that global carbon prices achieve much greater emission reductions for a much smaller economic cost than the unilateral carbon prices modelled in scenarios 1 and 2. This implies that applying global carbon prices are likely to be a much more efficient way to achieve the objective of reducing global emissions than unilateral and patchy country carbon prices. Implementing even modest carbon prices may not seem feasible, particularly for the poorest countries, therefore, creative approaches may be needed to achieve global outcomes. For example, the negative economic impacts from setting a carbon price in the most vulnerable countries could be compensated by developed countries that will benefit from much lower costs of reducing global emissions than if they only focus on policies in their own economies.

"When a global carbon price of $50 is implemented, global exports and investments are projected to fall by more than 0.5 per cent."

Table 6.3 also shows the impacts of the different scenarios on investment and real exports. While the direction of change is the same for real GDP, exports and investment, the magnitude of the impact differs. When 2019 carbon prices are implemented, exports decrease by approximately 0.3 per cent, which is much more than the real GDP reduction of about 0.06 per cent. When a global carbon price of $50 is implemented, global exports and investment are projected to decline by more than 0.5 per cent. In contrast, the elimination of fossil fuel subsidies leads to increases in exports and investment.

2. Emissions impacts in the Asia-Pacific region

This section examines impacts disaggregated by major regions and the subregions in Asia and the Pacific.[20] Table 6.4 shows some significant differences by aggregate region under scenario 1 ("existing carbon prices"). The Republic of Korea contributed to reduced global emissions reductions by 58 MT. In the United States and China, percentage reductions in emissions are relatively small, given their relatively low carbon prices and coverage of emissions. However, based on the size of these economies, the small percentage in reductions translate into high absolute value reductions in emissions of more than 75 MT for the United States and more than 50 MT for China.

"EU+ carbon pricing schemes contribute to the reductions of 360 MT of CO2, whereas resultant carbon leakages are 42 MT of CO2."

In subregions where there is little or no coverage of carbon prices, including South and South-West Asia and South-East Asia (table 6.2), emissions tend to increase slightly when prices are placed on other regions – as carbon leakage. Given the 2019 carbon price schemes modelled, the results suggest leakage of carbon leads to relatively small increases in emissions. When considering the leakage resulting only from EU+ existing carbon prices, the increases are between 0.1 and 0.6 per cent or a total of about 42 MT (table 3, column 3) – this is considerably smaller than the reduced emissions of almost 360 MT in the EU+ region.

[20] See Strutt and others (forthcoming).

Table 6.4 **Simulated CO2 emissions by aggregate region, scenarios 1-4, percentage change**

	Initial 2014 emissions	Scenario 1		Scenario 2		Scenario 3		Scenario 4
	(MT CO2)	Existing carbon prices	Due to EU+ carbon prices	Carbon prices + CBAM	Due to CBAM	Global carbon tax $10	Global carbon tax $50	Fossil fuel subsidy elimination
Pacific	420	-0.2	0.2	-0.3	-0.1	-6.1	-21.7	0.8
East and North-East Asia	10 074	-1.2	0.1	-1.2	0.0	-11.3	-32.2	-0.8
South-East Asia	1 352	0.4	0.3	0.3	-0.1	-6.9	-22.1	-1.7
South and South-West Asia	3 587	0.2	0.2	0.1	-0.1	-9.3	-30.5	-15.7
North and Central Asia	1 895	-0.1	0.3	-0.5	-0.4	-7.3	-23.3	-6.3
Total Asia-Pacific region (%)		**-0.6**	**0.1**	**-0.7**	**-0.1**	**-10.0**	**-29.8**	**-4.5**
Total Asia-Pacific (MT CO2)	**17 327**	**-107**	**22**	**-125**	**-18**	**-1731**	**-5165**	**-780**
Rest of Europe and Asia	648	0.4	0.6	-0.8	-1.2	-14.6	-42.8	-14.9
North America	5 719	-2.9	0.2	-2.9	0.0	-7.7	-28.2	0.5
Latin America	1 718	0.0	0.3	0.0	-0.1	-3.7	-13.5	-1.3
EU+	3 396	-10.4	-10.5	-10.1	0.3	-3.3	-12.0	1.3
Rest of the world	2 620	-2.4	0.3	-2.5	-0.1	-7.2	-24.1	-7.2
TOTAL (MT CO2)	**31 429**	**-685**	**-307**	**-705**	**-18**	**-2 631**	**-8 330**	**-1 010**

Source: Authors' model results.

"Increases in emissions in LDCs exempted from CBAM are relatively small and total less than 0.5 MT of CO2, suggesting that the environmental impacts of excluding them is relatively low."

"Imposing global carbon prices of only $10 reduces emissions in all of the Asia-Pacific subregions much more significantly than existing carbon pricing mechanisms."

Under scenario 2 ("existing carbon prices + CBAM"), implementing CBAM reduces emissions in all aggregate regions outside the EU+ (table 6.4, column 5). At a more disaggregated level, in some economies where 2019 carbon prices are already in place or are categorized as an LDC are excluded from the CBAM, there may be small increases in emissions. For example emissions in Japan increase by 1 MT and in the Republic of Korea, they rise by 0.4 MT. However, the increases in emissions in LDCs assumed exempted from CBAM are relatively small, totalling less than 0.5 MT of CO2, suggesting that the environmental impacts of excluding them is relatively low.[21]

Imposing global carbon prices (scenario 3), even only $10, reduces emissions in all of the Asia-Pacific subregions much more significantly as compared to 2019 carbon prices.[22] As shown in table 6.4, the impacts of a $10 global carbon price are particularly large in East and North-East Asia subregion. If the global carbon tax were $50 per tonne of CO2, a similar pattern would result, but of course, there would be much more substantial reductions in emissions. Of the total global emission reduction under these scenarios, China alone contributes more than 35 per cent, which is to a large extent behind the strong impact on East and North-East Asia. The

[21] These increases primarily arise from the sub-Saharan region.
[22] Given that every country imposes the global carbon prices modelled, there is no carbon leakage.

elimination of fuel subsidies leads to reductions in emissions in most subregions. This is not applicable to the Pacific because of the very limited number of fuel subsidies in place in the subregion. Particularly strong reductions occur in South and South-West Asia, as shown by the reduction in emissions of close to 16 per cent (table 6.4). Decomposing this further shows that electricity and gas subsidies in the Islamic Republic of Iran is a key factor behind the reductions. In North and Central Asia, emissions fall by more than 6 per cent in the fourth scenario; emissons in the Russian Federation and Kazakhstan decline by more than 50 MT after removal of their fossil fuel subsidies.

3. GDP, investment and trade impacts in the Asia-Pacific region

"Existing carbon pricing comes at an economic cost to the subregions implementing them and provides countries that are not implementing them with a marginal windfall."

Figure 6.2 (a)-(d) decomposes the impacts of the scenarios on GDP, investment and trade by Asia-Pacific subregions. Under scenario 1 (existing carbon prices), implementing existing carbon pricing comes at an economic cost to subregions implementing them, and provided countries that are not implementing them with a marginal windfall. More expensive foreign products that have internalized carbon costs are substituted by cheaper domestic or imported products that are not subject to the tax. All Asia-Pacific subregions also experience a boost in investment from existing carbon pricing schemes.

"Except for South and South-West Asia, CBAM does not have a substantive impact on the GDP of Asia-Pacific subregions."

Under scenario 2 (carbon prices with CBAM), Asia-Pacific subregions for the most part do not experience a substantive change in GDP. Indeed, in this combined scenario, the effect of CBAM alone negatively affects real GDP only in South and South-West Asia. The effect on real exports is more of a mixed-bag: Pacific and South-East Asia exporters benefit slightly, whereas exporters in East and North-East Asia, South and South-West Asian experience declines in real exports. All subregions but South-East Asia are predicted to experience a decline in imports, suggesting that CBAM will result in smaller trade flows into the Asia-Pacific region, primarily due to lower imports from the EU+ region. While not presented in the tables below, the redrawing of supply lines results in a reduction of 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 also expected to reduce investment in the region.

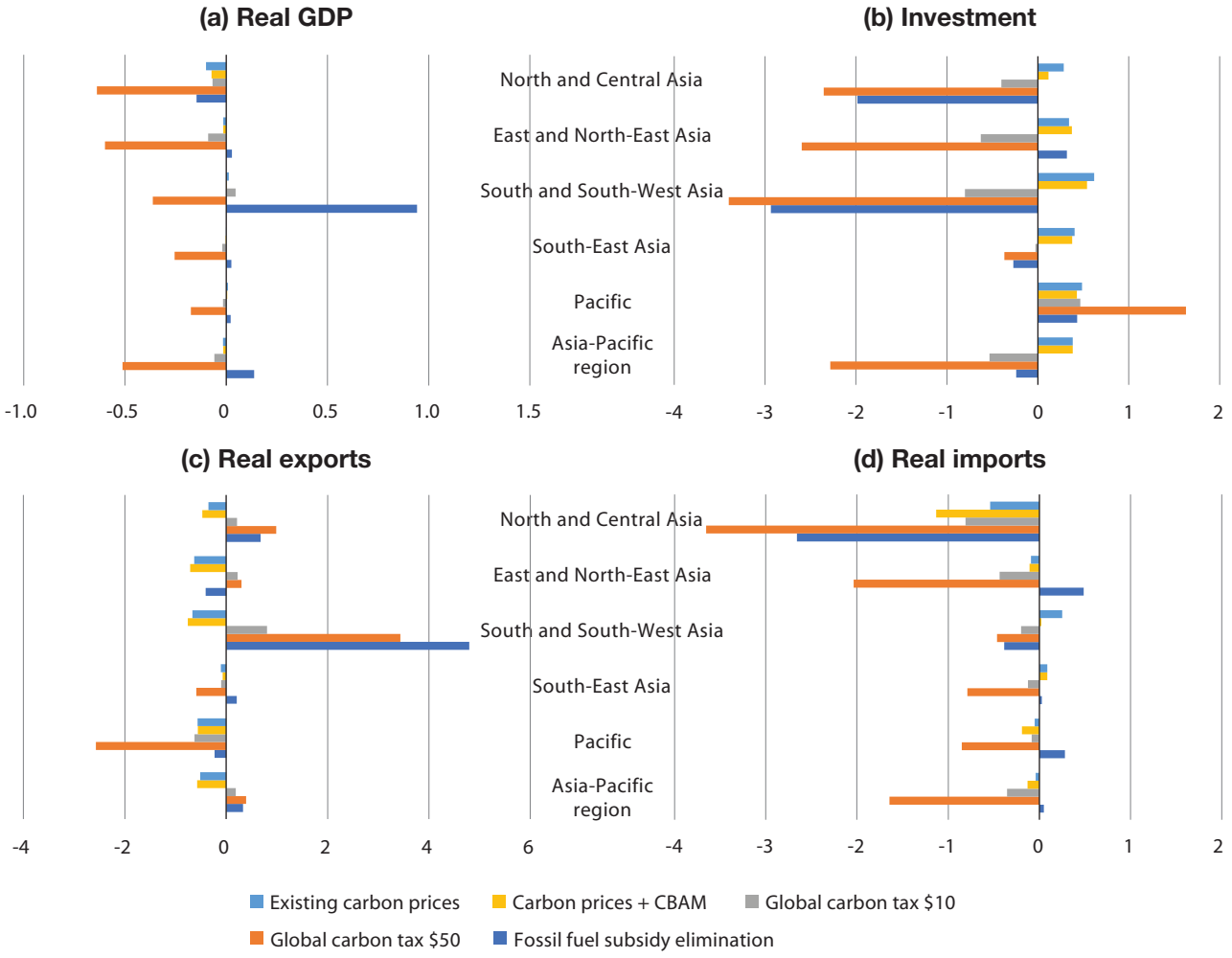
"With a global price of carbon of $50, the model shows that GDP declines in all Asia-Pacific subregions by between 0.18 and 0.64 per cent."

Global carbon taxes (scenario 3) offer the greatest benefits in terms of overall emission reductions (figure 6.2). At the same time, when the carbon price is $10, the cost to all subregions in the Asia-Pacific region is up to 0.07 per cent in terms of real GDP, except for South and South-West Asia. Under the scenario in which the global carbon price is $50, all subregions face GDP declines of between 0.18 and 0.64 per cent. Real exports decline in the Pacific and South-East Asia, and real imports decline in all subregions, particularly for North and Central Asia and East and North-East Asia. Declines in investment also occur in all of the subregions except for the Pacific.

"Elimination of fossil fuel subsidies results in increases in real GDP in all of the Asia-Pacific subregions, except for North and Central Asia, which is very dependent on fossil fuel production and exports."

Scenario 4 (elimination of fossil fuel subsidies) results in increases in real GDP in all of the subregions except for North and Central Asia, which is very dependent on fossil fuel production and exports. The trade impacts of removing existing fossil fuel subsidies vary significantly across countries and subregions, depending on the production and trade structure of each economy. For example, real exports increase significantly in South and South-East Asia, but decline in the Pacific and East and North-East Asia.

Figure 6.2 **Simulated impacts on selected indicators, percentage change, by Asia-Pacific subregion, scenarios 1-4**



Source: Authors' model results.

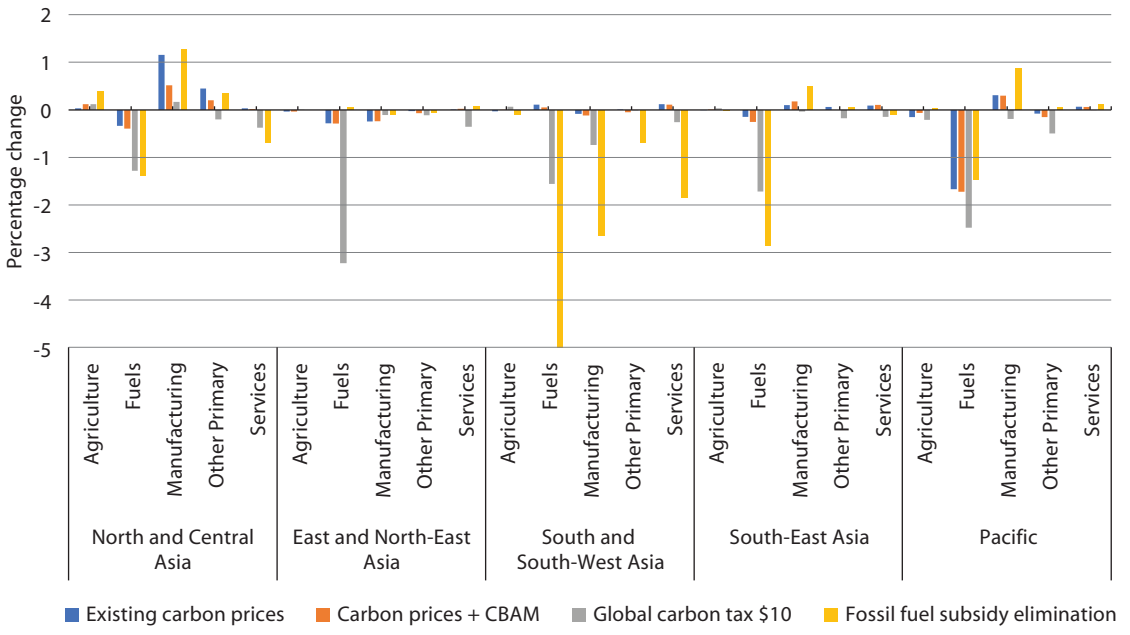
E. SECTORAL IMPACTS

Figures 6.3 depicts the impact of each scenario on sectoral outputs in the Asia-Pacific subregions. As expected, the most affected sector is "fuels" in each subregion.

In scenario 1 ("existing carbon prices") and scenario 2 ("existing carbon prices + CBAM"), the fuels sector in North and Central Asia decline. The inputs, including labour and capital, shift to other sectors, including to the manufacturing sector, which expands, offsetting some of the loss experienced in the affected fuels sector. Positive growth in service sectors also occurs in all of the subregions. CBAM implementation, however, dampens this effect, as some of the manufacturing output destined for the EU+ market is reduced, particularly in North and Central Asia where manufacturing exports to the EU+ decline by almost 18 per cent (comparing the results from scenarios 1 and 2 for manufacturing in North and Central Asia).

Interestingly, a global carbon tax (scenarios 3a and 3b) offers a different sectoral dynamic than the unharmonized and inconsistent carbon price schemes in scenarios 1 and 2. Almost all of the aggregate sectors in most of the subregions are

Figure 6.3 **Simulated changes on real output, aggregated sectors and regions**



Source: Authors' model results.

negatively affected, with the exception of the food and agricultural sector, which appears to be quite resilient to the tax, except in the Pacific subregion. Manufacturing and other primary output sectors decline as fuel inputs become more expensive. The services sector also shrinks, as many services subsectors, such as transportation, rely heavily on inputs from carbon-intensive fuel sectors.

Turning to the aggregated macroeconomic results in scenario 4 ("fossil fuel subsidy elimination"), the magnitude of the effect largely reflects the level of subsidies removed, as in the case of the Islamic Republic of Iran in South and South-West Asia. Notably, the largest increase in real GDP among the subregions modelled occurs in South and South-West Asia (figure 6.2(a)) because resources are reallocated more efficiently after the distortive impacts of the subsidies are removed. In the case of subregions with relatively low levels of subsidies, removal of subsidies can also affect the fuel sector negatively, mainly on the back of reduced global demand for intermediate inputs of fuel. However, surplus inputs are able to shift to other sectors.

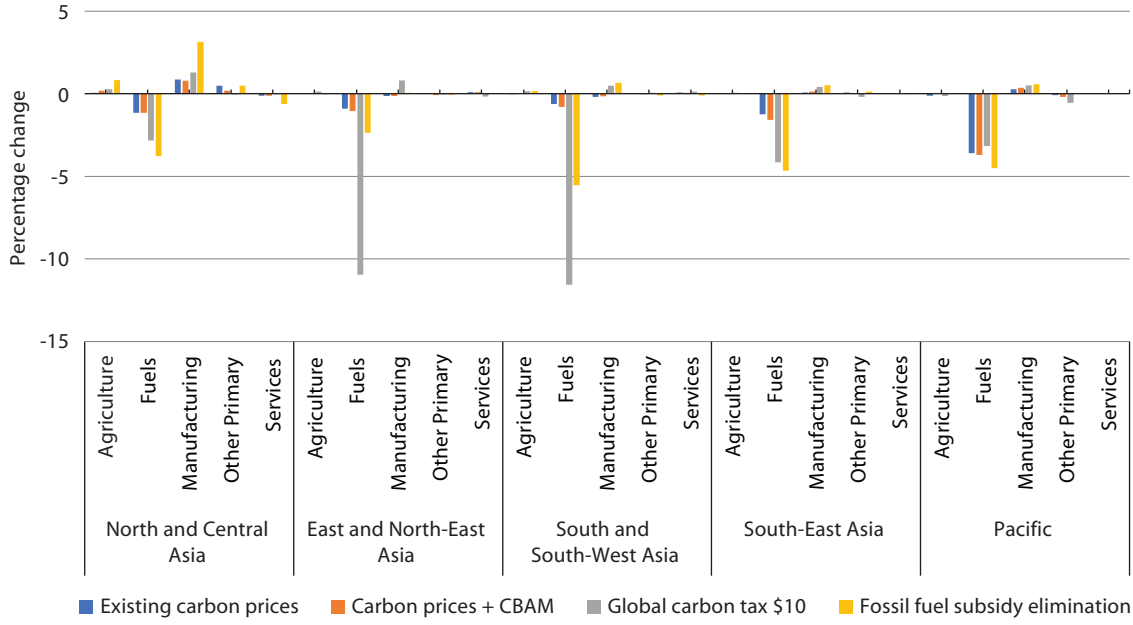
"Carbon pricing and the elimination of fuel subsidies affects employment within and across sectors. A clear negative employment effect is likely to weigh on the carbon-intensive fuel sectors."

Overall, the sectoral analysis, although very aggregate, suggests that putting in place carbon pricing and eliminating fuel subsidies affects employment within and across sectors and that a clear negative employment effect weighs on carbon-intensive fuel sectors.

As noted, the sectoral results have implications for workers in the affected sectors. Workers are likely to shift out of the most negatively affected sector, generally the fuels sector. Figure 6.4 shows the impacts on unskilled labour for each of the four scenarios.[23] Workers in the fuels sectors of East and

[23] Results for scenario 3b, the $50 global carbon tax magnify the impacts of Scenario 3a, the $10 global carbon tax, but are excluded here.

Figure 6.4 **Simulated impacts on unskilled labour, by aggregate region and sector, scenarios 1, 2, 3a and 4 (% change)**



Source: Authors' model results.

North-East Asia and South and South-West Asia tend to suffer the most, as the $10 global carbon tax results in a reduction of more than 10 per cent of unskilled labour in these two regions. For skilled workers, the impacts are similar but of a slightly smaller magnitude, with the reduction in skilled workers being less than 8.5 per cent. Skilled and unskilled workers are likely to shift into the manufactures, and to a lesser extent, the agro-food sectors.[24]

"Global carbon prices and the lifting of fossil fuel subsidies are mostly expected to lead to downward pressure on real wages in the Asia-Pacific region."

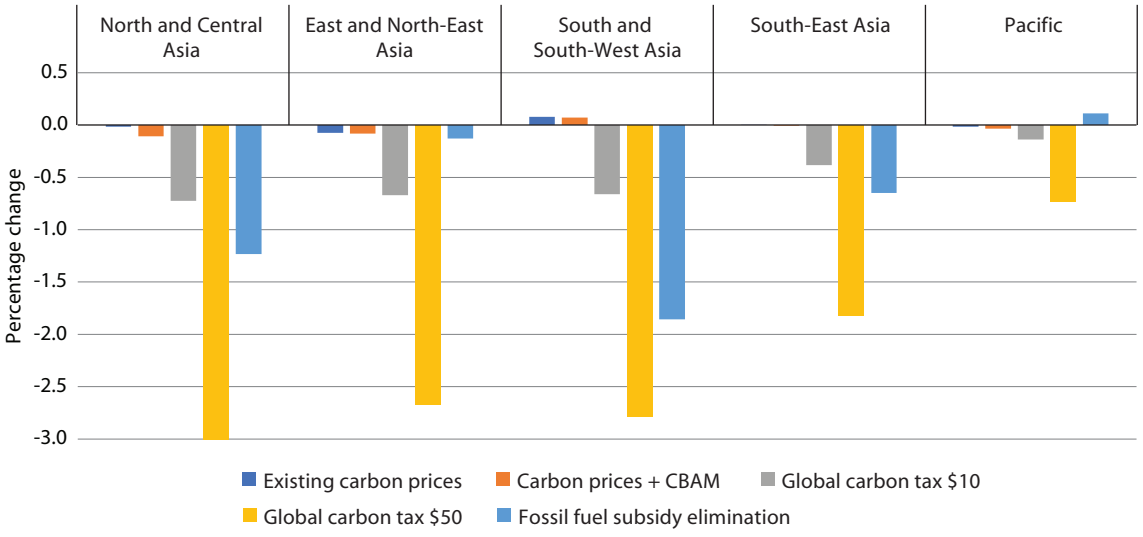
While workers may be able to shift into other sectors, there are impacts on real wages for unskilled (figure 6.5) and skilled workers. Real wages for both unskilled and skilled workers in the South and South-West Asia subregion increase slightly under scenarios 1 and 2; however, they fall after the introduction of a $10 global carbon tax (scenario 3a) and even more strongly when fossil fuel subsidies are eliminated (scenario 4). While all of the subregions shown are simulated to experience reduced real wages after the global carbon tax is implemented, and this reduction would be much more significant under a $50 carbon tax, the lifting of fossil fuel subsidies slightly increases the real wages of unskilled workers in the Pacific as well as skilled workers in the Pacific and in East and North-East Asia.

F. CONCLUSION

Using CGE analysis, the impact of carbon pricing policies, carbon border adjustment taxes, and the elimination of fossil fuel subsidies on emissions and the macroeconomy of the Asia-Pacific region is gauged. Quantitative estimates from alternative climate-smart policy scenarios indicate that carbon pricing, border tax adjustment or reductions in fossil fuel subsidies lead to lower emissions in implementing economies, as anticipated. The results also suggest that existing carbon price schemes imposed by countries since 2019 have led to a

[24] Full employment closure is assumed, workers freed up in one sector shift to other sectors.

Figure 6.5 **Simulated change in real wages of unskilled workers, scenarios 1, 2, 3a, 3b and 4 (% change)**



Source: Authors' model results.

modest reduction in global emissions and relatively limited carbon leakage. The implementation of the proposed CBAM by the the EU+ region causes emissions to fall slightly in most Asia-Pacific countries, particularly in those that do not have carbon prices in place, and for which the EU+ region is a large market, such as North and Central Asia. In some countries, CBAM slightly raises emissions, such as in Japan and the Republic of Korea, due to carbon taxes that are already in place. Overall, implementation of CBAM, on top of existing 2019 carbon prices, leads to a reduction in global emissions by only approximately 20 MT. The country-specific carbon prices modelled show an overall reduction in emissions, including in the Asia-Pacific subregions that impose carbon taxes, such as East and North-East Asia and the Pacific. However, global carbon prices spur much greater overall emission reductions, even when the price is set at the relatively low price of $10. The imposition of global carbon prices reduces emissions in all Asia-Pacific subregions by between 6 and 11 per cent in the case of a $10 carbon tax and between 22 and 32 per cent in the case of a $50 carbon tax being implemented. The removal of fossil fuel subsidies has the potential to reduce emissions in the Asia-Pacific region by seven times more than current carbon prices, while simultaneously leading to increases in aggregate economic output for all of the Asia-Pacific subregions, with the exception of North and Central Asia.

The analysis also shows that carbon price polices and policies designed to plug leakages are likely to result in economic costs. These costs, however, pale in comparison when contrasted with long-term costs of inaction due to climate change. It is important for Asia-Pacific economies to examine early the ramifications of upcoming carbon-mitigating mechanisms, and implement appropriate domestic policy reforms accordingly.

A range of carbon policies could contribute to global emission reductions; however, careful consideration is needed to ensure that the adverse effects do not outweigh the benefits, and do not unreasonably affect developing countries. Even though only a limited range of country-specific carbon prices and BTAs are modelled, it is possible that in combination with other carbon policies, BTAs could contribute to effective climate action, in particular when global carbon prices are not viable. However, the specifications of how BTAs could and will be calculated and implemented are still up for debate, and countries considering them should be mindful of WTO rules and impacts on developing economies.

REFERENCES

Ackerman, Frank, and Elizabeth Stanton (2008). The Cost of Climate Change: What we'll pay if global warming continues unchecked. National Resources Defense Council. Available at https://www.n.org/sites/default/files/cost.pdf.

Aguiar, Angel, and others (2019). The GTAP Data Base: Version 10. *Journal of Global Economic Analysis*, vol. 4, No. 1, pp. 1–27.

Bauer-Babef, Clara (2021). Poor countries in line to receive funds from EU carbon border levy. EURACTIV. Available at https://www.euractiv.com/section/energy-environment/news/poor-countries-in-line-to-receive-funds-from-eu-carbon-border-levy/.

Bruce, James, Hoesung. Lee, and Erik Haites, E. (eds.) (1996). *Climate Change 1995 – The Economic and Social Dimensions of Climate Change*. New York: Cambridge University Press.

Burniaux, Jean-Marc, Jean Chateaux, and Romain Duval (2013). Is there a case for carbon-based border tax adjustment? An applied general equilibrium analysis. *Journal of Applied Economics*. Vol. 45, (16), pp. 2231–2240.

Carbon Pricing Leadership Coalition (2017). Report of the High Level Commission on Carbon Prices. Washington D.C.: International Bank for Reconstruction and Development and International Development Association/ The World Bank.

_____ (n.d.). What is Carbon Pricing? Carbon Pricing Leadership Coalition. Available at https://www.carbonpricingleadership.org/what#:~:text=Carbon%20pricing%20is%20an%20approachof%20emitting%20on%20to%20emitters.

Corong, Erwin, and others (2017). The Standard GTAP Model, Version 7. *Journal of Global Economic Analysis*, vol. 2, No. 1, pp. 1–119.

_____ (2020). *GTAP-E model, Version 7: An Energy-Environmental Version of GTAP* (manuscript). Center for Global Trade Analysis, Purdue University.

Dong, Yan, and John Whalley (2009). How large are the impacts of carbon motivated border tax adjustments? NBER Working Paper No. 15613. Available at https://nber.org/papers/w15613.

Emerson, Craig, and Stefano Moritsch (2021). Making carbon border adjustment proposals WTO-compliant. KPMG, 25 March. Available at https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/03/making-carbon-border-adjustment-proposals-wto-compliance.pdf.

European Commission (2020). Carbon Border Adjustment Mechanism. Annual meeting of the working group "Structures of Taxation Systems". Proposal for a regulation of the European Parliament and of the Council Establishing a Carbon Border Adjustment Mechanism. 14 July. Available at https://ec.europa.eu/info/sites/default/files/carbon_border_adjustment_mechanism_0.pdf.

_____ (2021). Carbon Border Adjustment Mechanism: questions and answers. 14 July. Available at https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661.

European Parliament (2021a). Legislative Train: Carbon Border Adjustment Mechanism as part of the European Green Deal. June Available at https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-border-adjustment-mechanism.

_____ (2021b). Towards a WTO-compatible EU border carbon adjustment mechanism. Committee on the Environment, Public Health and Food Safety. A9-0019/2021. Available at https://www.europarl.europa.eu/doceo/document/A-9-2021-0019_EN.pdf.

Flannery, Brian, and others (2020). Framework proposal for a US upstream GHG tax with WTO-compliant border adjustments: 2020 update. Resources for the Future, 23 October. Available at https://www.rff.org/publications/reports/framework-proposal-us-upstream-ghg-tax-wto-compliant-border-adjustments-2020-update/.

Harrison, Jill, and others (2014). *GEMPACK Manual, GEMPACK Software*. Melbourne, Australia: Centre for Policy Studies.

Hasegawa, Tomoko, and others (2018). Risk of increased food insecurity under stringent global climate change mitigation policy. *Nature Climate Change*. vol. 8, pp. 699–703.

Hertel, Thomas (ed.) (1997). *Global Trade Analysis: Modeling and Applications*. Cambridge and New York: Cambridge University Press.

International Energy Agency (IEA) (2013). Redrawing the energy-climate map: world energy outlook special report. Available at https://iea.blob.core.windows.net/assets/417cd627-fda9-470e-9380-1203a5315deb/WEO_Special_Report_2013_Redrawing_the_Energy_Climate_Map.pdf.

_____ (2021). Energy subsidies: tracking the impact of fossil fuel-fuel subsidies. Available at https://www.iea.org/topics/energy-subsidies.

Liu, Peiran, and Adrian Raftery (2021). Country-based rate of emissions reductions should increase by 80% beyond nationally determined contributions to meet the 2°C target. *Communications Earth & Environment*, vol. 2, No. 1.

Nedumpara, James, and Shiny Pradeep (2021). Implementing carbon tax: from rhetoric to reality. *Indian Journal of International Law* vol. 59, pp. 139–171.

Organisation for Economic Co-operation and Development (OECD) (2021). Climate change: consequences of inaction. OECD COP21. Available at https://www.oecd.org/fr/environnement/climate-change-consequences-of-inaction.htm.

Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) (2021). Perception of the planned EU carbon border adjustment mechanism in Asia Pacific – An expert survey. *RECAP*. Available at https://www.kas.de/documents/265079/265128/EU+Carbon+Border+Adjustment+Mechanism.pdf/fed1d5a4-4424-c450-a1b9-b7dbd3616179?version=1.1&t=1615356593906.

Rogelj, Joeri, and others (2018). Mitigation pathways compatible with 1.5°C in the context of sustainable development. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Available at from https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf.

Strutt, and others (forthcoming). Carbon border adjustment policies and other climate-smart trade and investment policies: Potential impacts on the Asia-Pacific region with CGE. ARTNeT Working Paper Series.

Soprano, C. (2021). Integrating gender into the work of ESCAP's Trade, Investment and Innovation Division. Trade and Innovation Division. Draft report gender into programmatic work.

United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2017). Asia-Pacific Trade and Investment Report 2017: Channelling Trade and Investment into Sustainable. Chapters 3 and 4. Development. United Nations publication, Sales No. E.II.22.

_____ , and Untied Nation Conference on Trade and Development (UNCTAD) (2019). Navigating Non-Tariff Measures towards Sustainable Development. United Nations publication, Sales No. E.19.II.F.14.

United Nations Conference on Trade and Development (UNCTAD) (2021). A European union carbon border adjustment mechanism: implications for developing countries. Available at https://unctad.org/system/files/official-document/osginf2021d2_en.pdf.

United Nations Framework Convention on Climate Change (UNFCCC) (1992). Available at https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

Utoktham, Chorthip, Alexey Kravchenko, and Yann Deval (2020). New global estimates of import demand elasticities: a technical note. ESCAP, July 15. Available at https://www.unescap.org/resources/new-global-estimates-import-demand-elasticities-technical-note.

Weinberger, Katinka, and others (2021). How can carbon pricing contribute to post-Covid-19 recovery? ESCAP blog., 15 September. Available at https://www.unescap.org/blog/how-can-carbon-pricing-contribute-post-covid-19-recovery.

Winchester, Niven, Sergey Paltsev, and John Reilly (2011). Will border carbon adjustments work? *The B.E Journal of Economic Analysis and Policy*. vol. 1, No. 1, pp. 1–27.

World Bank (n.d.). Pricing carbon. Available at https://www.worldbank.org/en/programs/pricing-carbon.

Yi-Ming, Wei, and others (2020). Self-preservation strategy for approaching global warming targets in the post-Paris Agreement era. *Nature Communications*, vol. 11.

Zhang, Z. and Baranzini, A. (2004). What Do We Know About Carbon Taxes? An Inquiry into Their Impacts on Competitiveness and Distribution of Income. *Energy Policy*. Vol. 32, (4), pp. 507–518. https://doi.org/10.1016/s0301-4215(03)00152-6.

CHAPTER

Conclusion and recommendations

Addressing climate change has become an increasingly urgent global priority. Climate-smart considerations need to permeate activities and decisions by all actors. Trickle down effects of trade and investment alone are not enough to ensure non-economic aspects of sustainable development, including those of climate change.

The relationship between trade and investment and climate change is complex. On one hand, trade potentially makes it possible to bypass climate policies by providing access to relatively more polluting sources of goods. Similarly, uninhibited investment can create incentives to invest in destinations with lax climate regulations. Long distances and inefficient logistics can exacerbate the problem through excessive transport emissions. On the other hand, purchasing from foreign suppliers with more carbon efficient production processes may more than offset transportation emissions. Most importantly, trade and investment are indispensable in climate action for diffusion of environmental goods and services and transfers of green technologies. **The key, therefore, is to maximize the benefits offered by trade and investment to address climate change, while minimizing their risks and costs**.

As they ramp up to address climate change, major economies within and outside the Asia-Pacific region are implementing policies to address erosion of competitiveness and carbon leakages to jurisdictions with less stringent climate policies. Such policies can adversely affect the economic well-being of the developing economies in the region, as they face difficulties in adapting to the additional trade and other costs generated by these new policies, at least in the short term. Special considerations aside, policymakers in Asia-Pacific region need to better understand and brace themselves for a trade and investment policy environment that seeks to

tackle the looming climate change crisis. **To prepare their economies for this new market environment, countries need to be proactive and seek regional cooperation.**

The following is a summary of the main policy recommendations discussed throughout this report.

1. Liberalize trade in climate-smart and other environmental goods and services

While trade can contribute to global GHG emissions, it is also essential for the diffusion of technologies to address climate change. Priority must be accorded to liberalizing and otherwise facilitating trade in climate-smart and other environmental goods and services by reducing tariffs and other trade barriers. This can be done unilaterally or as part of regional or multilateral initiatives, possibly building on initiatives already being implemented by APEC members or the Parties negotiating AACTS, or by revitalizing related efforts at WTO. Asia-Pacific countries may also actively consider how to prioritize removing tariffs on such goods and services under RTAs that they are Party to – or negotiating.

2. Phase out fossil fuel subsidies

Fossil fuel subsidies constitute barriers to trade, as they alter relative prices of related products, hampering adoption of more climate-smart technologies. The risk is also increasing that economies and industries utilizing them will face punitive carbon tariffs as part of carbon border adjustment systems. Asia-Pacific economies (and beyond) should, therefore, prioritize phasing out expensive, inefficient, regressive and environmentally damaging fuel subsidies, which would generate fiscal space for addressing other aspects of sustainable development. Importantly, phasing out initiatives needs to ensure that the most vulnerable segments of society that rely on such subsidies are supported in other ways, such as through direct cash transfers.

3. Adopt climate-smart non-tariff measures

Non-tariff measures (NTMs) may be considered to regulate the technical characteristics of traded goods so that their contribution to climate change during use and disposal is limited. Such NTMs can include requirements pertaining to high energy performance of household appliances, less polluting emissions from motor vehicles and fuel-powered equipment, restrictions to imports goods containing or emitting powerful greenhouse gases, and certification of legal and sustainable sourcing of timber and forest products. Relevant goods can be required to carry appropriate labelling. Importantly, such regulations should comply with the WTO TBT and SPS agreements and be put in place after careful sustainability impact assessments to avoid unintended consequences (discussed in ESCAP and UNCTAD, 2019). In addition, or as an alternative to NTMs, Governments may want to encourage adoption of relevant voluntary sustainability standards, such as eco-labelling of emission-intensive goods and food products.

4. Encourage climate-smart investment and private sector initiatives

To reduce emissions, production processes need to be made more energy and input efficient and circular thinking should be applied. This involves large-scale structural transformation, with new markets and new jobs replacing old industries and niches. Governments can play an important catalysing role and lead by example by directing investment bodies under their control to reorient their funds to sustainable investing. Governments can also step up requirements in terms of sustainability reporting of companies that operate domestically and provide preferential access to finance, tax breaks or other incentives for implementing climate-smart initiatives, such as setting up internal carbon accounting systems. Reporting requirements and preferential access to incentives should also apply to FDI projects, especially greenfield FDI. To further support this, Governments should consider incorporating climate-related actions into their international investment agreements and build the capacity of their investment promotion agencies to evaluate and monitor the climate impact of FDI projects.

5. Accelerate trade digitalization

Streamlining trade procedures reduces trade costs and makes trade more inclusive, but it also significantly lowers CO2 emissions associated with a given trade transaction. Adopting paperless trade procedures is particularly promising, especially if trade-related data and documents can be exchanged and legally recognized across borders. Asia-Pacific Governments may, therefore, actively seek to

accelerate customs and trade digitalization and adoption, including by leveraging tools and solutions available across the United Nations system and acceding to the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific, which entered into force in February 2021.

6. Transition to climate-smart transport

Transport comprises the largest share of emissions associated with any given cross-border trade transaction. Governments should, therefore, support a transition to cleaner or more resource efficient transport systems, including by instituting policies to support investment in modes of transport that support high volumes of trade and operate with lower emissions. Digitalization of transport processes also holds great promise to reduce emissions by optimizing utilization of existing logistics infrastructure. Existing regional frameworks, such as the Intergovernmental Agreement on the Trans-Asian Railway Network, should be used as a platform to pilot test and develop more interoperable and digitalized climate-smart transport systems. Regional cooperation is also important to ensure that new policies and regulations are put in place to support the transition to more climate-friendly international transport systems that do not unduly affect the ability of smaller and more remote economies to engage in international trade.

7. Incorporate climate considerations in regional trade and investment agreements

Regional trade and investment agreements can be a powerful tool for bilateral and plurilateral climate actions. An increasing number of RTAs, many of which are comprehensive economic partnership agreements, are incorporating environmental, and to a lesser extent, specific climate actions provisions. 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 the positive impacts. Aside from cutting tariffs on environmental goods, mentioned earlier, RTAs could integrate provisions related to most of the recommendations mentioned above, including binding commitments on fossil fuel subsidies. Provisions to facilitate green investment and for climate friendly public procurement could also be expanded. ISDS clauses should also be carefully drafted so that they do not inadvertently hinder the adoption of ambitious climate policy by Governments out of litigation concerns. Importantly, keeping in mind the costs involved in implementing climate-smart policies, RTAs could also be used to provide adequate technical assistance and other resources to developing country trade partners.

8. Prepare for carbon pricing

The analysis presented in the report clearly highlights the need to put a price on carbon, so that stakeholders internalize the environmental costs of carbon emissions when making a decision whether to engage in a particular trade or investment activity. Carbon pricing instruments can be a powerful component of the post-Covid-19 recovery packages, which can address GHG emissions and raise much needed revenue for fiscal spending. Global action aside, coordinated regional action will deliver more efficient results, reduce risks of carbon leakage and be more acceptable to the general public, especially if the revenue collected is effectively redirected to those most affected by the carbon pricing. While the design of a national or regional carbon pricing system is beyond the scope of the report, it is essential that all countries prepare for carbon pricing becoming a reality. Several large trade partners of Asia-Pacific economies are at the forefront of implementing carbon pricing policies and are increasingly wary of carbon leakages and associated loss of competitiveness. Economies in the region with low carbon emissions embedded in their products can potentially reap the benefits of border adjustment taxes, but those with high carbon emissions must redouble their efforts when transitioning to more carbon emission efficient production. This includes increasing the share of renewables in energy generation and considering internalizing costs of emissions through pricing mechanisms, particularly in export-related and emission intensive sectors.

9. Incorporate climate consideration in COVID-19 crisis recovery packages

Given that most Asia-Pacific economies are increasing fiscal spending to boost their economies as part of the COVID-19 recovery, such spending should be aligned with climate-action and the circular economy to the extent possible. Recovery packages may support sectors and activities that can help

reduce GHG emissions after the crisis, for example, supporting the renewable energy industry or the adoption of more efficient and cleaner transport technologies. Notably, some of these support measures may be seen as discriminatory in nature and inconsistent with current multilateral trade rules. Governments should, therefore, strive to make further progress at WTO in aligning multilateral trade regulations with climate action – and environmental protection in general.

10. Strengthen capacity for climate-smart trade and investment policymaking

As countries around the world ramp up climate action, policymakers in the Asia-Pacific region need to upskill in order to design and negotiate climate-smart trade and investment policies and agreements that meet the needs of their countries and mitigate the impact of third-party climate-change policies. General trade and investment policy analysis skills remain scarce in many developing economies of the region, particularly in least developed countries. Only a few trade and investment analysts and policymakers have a sufficient understanding of the complex interlinkages between trade, investment and climate change, given their interdisciplinary nature. Accordingly, specific capacity-building programmes should be considered, taking advantage of digital technologies and services to access knowledge and expertise abroad when necessary.

CONCLUSION

Climate-change driven disasters are on the rise globally, especially in the Asia-Pacific region. Human, environmental and economic costs of inaction are orders of magnitude higher than the costs of transitioning to a more climate-smart way of living. The report highlights the need for trade and investment policies to integrate climate change considerations more fully, given the important role of trade and investment regarding carbon emissions and their mitigation.

The report has also shown that climate change mitigation policies will come at a cost, affecting trade and investment opportunities and how trade and investment will be conducted. While these changes are necessary, special consideration and support must be place on developing economies. Multilateral and regional cooperation is essential to ensure that no economy is left behind (box 7.1). ESCAP, UNCTAD and UNEP will continue to collaborate and offer their analytical, capacity-building and intergovernmental platforms to facilitate progress towards climate-smart trade and investment.

Box 7.1

Mitigating the impact of carbon border taxes on developing countries: European Union initiatives

The Paris Agreement highlights the differences between developed and developing countries in term of the challenges faced (Flannery and other, 2020). However, the European Union is aiming to mitigate inequalities created by the CBAM through the Green Deal. This initiative is intended to turn environmental challenges into opportunities through an all-inclusive transition. The proposed Just Transition Mechanism (JTM) was created to ensure that "no one is left behind" (European Commission, n.d.). Essentially, the mechanism would create a fund of 150 billion euros (€) ($178 billion) from InvestEU Programme, and the European Investment Bank (EIB) public sector loan facility to aid European Union countries burdened with transition challenges. The eligibility of territories is still being identified. While it is important to note that the mechanism would only apply to European countries, a version of it could be replicated for developing Asia-Pacific economies if BTAs were to be implement.

Separate from the mechanism, the European Union plans to allocate between €5 billion and €14 billion per year to the world's poorest countries (Bauer-Babef, 2021). This is to ensure that CBAM is compatible with WTO rules, and is earmarked to develop low carbon technologies in developing countries. Pascal Canfin, chair of the European Parliament Environmental Committee, has stated that for this strategy to be useful, traceability and clear objectives need to be provided by the receiving countries to ensure funds are used in the directed manner (Bauer-Babef, 2021).

REFERENCES

Bauer-Babef, Clara. (2021). Poor countries in line to receive funds from EU carbon border levy. EURATIV, 8 March. Available at https://www.euractiv.com/section/energy-environment/news/poor-countries-in-line-to-receive-funds-from-eu-carbon-border-levy/.

Flannery, Brian, and others (2020). Framework proposal for a US upstream GHG tax with WTO-compliant border adjustments: 2020 update. Resources for the Future, 23 October. Available at https://www.rff.org/publications/reports.

United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP), and United Nations Conference on Trade and Development (UNCTAD (2019). *Asia-Pacific Trade and Investment Report 2019: Navigating Non-tariff Measures towards Sustainable Development*. United Nations publication, Sales no. E.19.II.F.14.

READERSHIP SURVEY

Asia-Pacific Trade and Investment Report 2021

The Trade, Investment and Innovation Division of ESCAP is undertaking an evaluation of the above publication with a view to improving its quality and usefulness. We would appreciate it if you could complete this questionnaire and return it to us, at the address printed below.

QUESTIONNAIRE

Rating for quality and usefulness (please circle)	*Excellent*	*Very good*	*Good*	*Poor*
1. How useful is this publication for your work?				
• Provision of information	4	3	2	1
• Clarification of issues	4	3	2	1
• Findings	4	3	2	1
• Policy suggestions	4	3	2	1
• Overall usefulness	4	3	2	1
2. Please indicate your assessment of the quality of this publication with respect to:				
• Presentation/format	4	3	2	1
• Readability	4	3	2	1
• Coverage of subject matter	4	3	2	1
• Timeliness of information	4	3	2	1
• Overall quality	4	3	2	1

3. Suggestions for improvement of the publication:

.....

.....

.....

.....

4. Your background information, please:

Name: ……..

Title/position: .....

Institution: .....

Office address: .....

Tel: ..... Fax: .....

Email: .....

Please return this questionnaire to:

Director
Trade, Investment and Innovation Division
ESCAP
United Nations Building
Rajadamnern Nok Avenue
Bangkok 10200
THAILAND
Fax: (66 2) 288 1027
Email: escap-tiid@un.org

Thank you for your cooperation.

United Nations publications may be obtained from bookstores and distributors throughout the world.
Please consult your bookstore or write to any of the following:

Customers in: America, Asia and the Pacific

Email: order@un.org
Web: un.org/publications
Tel: +1 703 661 1571
Fax: +1 703 996 1010

Mail Orders to:
United Nations Publications
PO Box 960
Herndon, Virginia 20172
United States of America

Customers in: Europe, Africa and the Middle East

United Nations Publications
c/o Eurospan Group
Email: info@eurospangroup.com
Web: un.org/publications
Tel: +44 (0) 1767 604972
Fax: +44 (0) 1767 601640

Mail Orders to:
United Nations Publications
Pegasus Drive, Stratton Business Park
Bigglewade, Bedfordshire SG18 8TQ
United Kingdom

For further information on this publication, please address your enquiries to:

Director
Trade, Investment and Innovation Division
Economic and Social Commission for Asia and the Pacific (ESCAP)
United Nations Building, Rajadamnern Nok Avenue
Bangkok 10200, Thailand
E-mail: escap-tiid@un.org

The Asia-Pacific Trade and Investment Report (APTIR) is a biennial publication prepared by the Trade, Investment and Innovation Division of the United Nations Economic and Social Commission for Asia and the Pacific to provide insights into the impact of recent and emerging developments in trade and foreign direct investment on countries' abilities to meet the challenges of achieving sustainable development.

The theme of APTIR 2021 is "Accelerating climate-smart trade and investment for sustainable development". The report, prepared in cooperation with the United Nations Conference on Trade and Development and the United Nations Environment Programme, highlights the linkages between trade, investment and climate change and discusses the degrees to which regional trade and investment policies address climate change using a newly constructed index. The report also covers the role of the private sector, regional trade agreements and trade and transport facilitation measures in reducing greenhouse gas emissions. For this report, alternative policy scenarios of carbon pricing, carbon-border adjustment taxes and fossil fuel subsidy elimination are modelled and their impacts are examined. The report closes by offering policy recommendations for ensuring that trade and investment policies are climate smart.

ISBN: 978-92-1-120822-0