CARBON PRICING FOR GREEN RECOVERY AND GROWTH

NOVEMBER 2021

ASIAN DEVELOPMENT BANK

ADB

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6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
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In this publication, "$" refers to United States dollars.
ADB recognizes "China" as the People's Republic of China, "Korea" as the Republic of Korea, and "Vietnam" as Viet Nam.

On the cover: Implementing carbon pricing policies can incentivize and facilitate the transition from fossil fuels to renewable energy technologies while fostering green recovery and growth (photos by Al Benavente and Patarapol Tularak for ADB)

Cover design by Edith Creus.

Contents

Table, Figures, and Boxes

Table

Figures

Boxes

Foreword

Climate change continues to affect many aspects of our day-to-day life as we experience a sharp increase in climate shocks and stress. The Asia and Pacific region is particularly vulnerable to the impacts of climate change and is facing more intense and frequent extreme weather events affecting livelihoods, food and water security, and the health of millions of people. More than 60% of the people in the Asia and Pacific region work in sectors highly susceptible to changing weather patterns, and the situation is likely to worsen.

The Sixth Assessment Report of the Intergovernmental Panel on Climate Change published in August 2021 reiterates the scale of the climate change challenge. If the global community takes aggressive action and brings about transformational change at present, temperature rise can be limited to 1.5°C by mid-century. But if current trends continue, the Earth is on course to reach 1.5°C of warming within the next 2 decades. Despite the decrease in global greenhouse gas (GHG) emissions due to the economic downturn resulting from the coronavirus disease (COVID-19) pandemic, emissions are rising again. We are now dangerously close to the point where action will be too little and too late.

The battle against climate change will be won or lost in Asia and the Pacific: the region is currently responsible for over 50% of global GHG emissions. Alongside the urgent need to decarbonize and reduce GHG emissions, Asia and the Pacific faces the need to recover economically from the COVID-19 pandemic. The Asian Development Bank (ADB) recognizes that the need to meet these twin challenges requires us to not see them in competition with each other for scarce resources, but rather as synergistic, together creating an opportunity and a motivation to pursue green, resilient, inclusive, and sustainable economic growth.

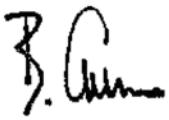
Doing so will require both domestic and international sources of finance. Carbon pricing can play a major role in mobilizing both and, thereby, create fiscal space for investment. Carbon pricing is a key element of the broader climate policy architecture to help countries reduce their emissions cost-effectively while mobilizing fiscal resources to drive green recovery and growth. It is therefore no surprise to see growing momentum in the use of carbon-pricing instruments. As of July 2021, there were 64 carbon-pricing instruments in operation that cover approximately 22% of global GHG emissions, compared to 15% in 2010. There is also increased impetus and momentum in the Asia and Pacific region to establish carbon-pricing systems, with six initiatives implemented at the national level. Japan and Singapore employ carbon taxes. Kazakhstan, New Zealand, the Republic of Korea and, most recently the People's Republic of China, have launched emission trading systems. In addition, Indonesia, Pakistan, the Philippines, Thailand, and Viet Nam are preparing to adopt carbon-pricing instruments.

At ADB, we are fully prepared to support urgent action and committed to supporting our developing member countries (DMCs) to use well-designed carbon pricing as part of their policy mix for green recovery and growth. We have long-standing experience and expertise with carbon markets and have provided technical capacity building and carbon finance to support GHG mitigation across the region. We have also established the Article 6 Support Facility to provide technical assistance, capacity building, policy development support, and piloting opportunities to our DMCs. The facility also aims to enhance countries' ability to establish and take advantage

of domestic, bilateral, and international carbon markets and, where applicable, integrated markets to scale up their efforts in achieving the mitigation targets in their nationally determined contributions (NDCs) and raising mitigation ambition over time.

This commitment and support are consistent with ADB's Strategy 2030, which reflects its vision to achieve a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining efforts to eradicate extreme poverty. Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability are among the operational priorities of ADB's Strategy 2030. In 2018, ADB committed to ensuring at least 75% of the total number of its operations support climate action and its own climate finance resources reach at least a cumulative $80 billion by 2030. The bank has now announced it is elevating its ambition to deliver climate financing to its DMCs to $100 billion from 2019–2030. However, additional resources will be required, and a variety of policy instruments are needed to mobilize additional finance.

This publication highlights the benefits of and considerations to address when introducing carbon-pricing instruments in the context of green recovery and growth. We hope that the paper will help policy makers to continue their efforts to formulate, design, plan, and implement an efficient and integrated response to both climate change and the COVID-19 pandemic, wherein carbon pricing can play an important role both in achieving current NDC targets and in elaborating road maps for longer-term net-zero development.



Bruno Carrasco
Director General (concurrently Chief Compliance Officer)
Sustainable Development and Climate Change Department
Asian Development Bank

Preface

Carbon pricing is an integral element of the broader climate policy architecture that countries can use to internalize the cost of emitting greenhouse gases (GHGs) and, thereby, enable transitioning to low-carbon economies. The most widely used carbon-pricing instruments include carbon taxes, emissions trading systems (ETS–domestic cap and trade), and international offset mechanisms. A predictable and clear carbon-pricing policy signal, regardless of the policy instrument used to achieve it, can help re-orient capital flows toward environmentally and socially sustainable investments, support innovation, and accelerate the deployment of advanced low-carbon technologies.

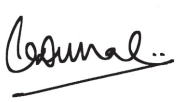
Carbon pricing can stimulate action to achieve short-term climate mitigation targets (such as those expressed in nationally determined contributions (NDCs) and plays a key role in road maps for achieving longer-term targets toward net-zero emissions. The NDCs submitted by some Asian Development Bank (ADB) developing member countries (DMCs) contains references to carbon pricing. For example, Brunei Darussalam and Singapore have explicitly mentioned the use of domestic carbon pricing. In addition, 20 DMCs expressed their intent or consideration of using market mechanisms in their first round of NDCs. Having said that, many countries have focused their NDCs on adopting policies to enable and promote investments in renewable energy and energy efficiency measures, and have not included carbon pricing as a key policy instrument for achieving their mitigation targets.

Nevertheless, momentum is growing not just globally but also in our region where—alongside the countries that have already implemented carbon-pricing instruments—several DMCs are exploring the possibility of introducing carbon-pricing instruments. For example, between March and August 2021, Indonesia hosted a voluntary ETS trial for the power sector, covering 80 coal-fired power plants. Indonesia is also considering adopting a carbon tax. The National Assembly in Viet Nam has adopted legislation to prepare for the implementation of a domestic ETS. Thailand has developed voluntary schemes while Pakistan has conducted studies on the feasibility of introducing carbon-pricing instruments.

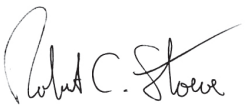
In addition to enabling mitigation efforts, carbon pricing can support green recovery from the coronavirus disease (COVID-19) pandemic in the near term and sustained long-term low-carbon green economic growth. This is the right time to move toward employing carbon-pricing instruments or accelerate their implementation where they have already been adopted. Doing so can prevent a distorted economic recovery, generate revenues to reduce fiscal deficits, and/or support consumption and investment. However, capitalizing on these benefits requires that governments make informed choices regarding the selection of an instrument or instruments that are appropriate and designed to fit their specific national priorities and circumstances. Impact assessments and stakeholder consultations are important tools for understanding the potential social and economic impacts of carbon-pricing instruments. Assessing the potential impacts of different policy scenarios may reveal a diverse range of impacts on households, firms, and communities, as well as the national economy.

ADB has long-standing experience with carbon markets and in providing technical capacity building and carbon finance to support the implementation of GHG mitigation activities across the region. ADB sees the new market-based mechanisms emerging under Article 6 of the Paris Agreement as an integral part of national climate policy frameworks and is committed to supporting our developing members to integrate carbon pricing into their policy mix for stimulating green economic growth, navigating onto a long-term low-carbon development path, and pursuing net-zero targets.

We hope that this publication will help policy makers increase their understanding of the variety of carbon-pricing instruments that are available, how they fit in a larger climate policy context, and the role that carbon pricing can play in achieving green economic recovery and growth. It is hoped that this publication will help countries continue their efforts to design and implement an efficient climate change response where carbon-pricing instruments that suit national circumstances and priorities can play an important role in achieving their NDCs and in developing a road map for longer-term net-zero targets.



Virender Kumar Duggal
Principal Climate Change Specialist
Sustainable Development and
Climate Change Department
Asian Development Bank



Robert Stowe
Co-Director, Harvard Project
on Climate Agreements

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Virender Kumar Duggal, principal climate change specialist, Climate Change and Disaster Risk Management Division, ADB, conceptualized and guided development of this knowledge product.

The knowledge product has been developed with the overall guidance and support from Robert Stowe, professor, Harvard University with inputs by a team of experts engaged under ADB's ongoing Technical Assistance 9695: Establishing a Support Facility for Article 6 of the Paris Agreement, which included George Anjaparidze, Rastraraj Bhandari, Deborah Cornland, and Johan Nylander, whose technical inputs are greatly appreciated.

This knowledge product has hugely benefited from the peer review conducted by ADB staff which included Daisuke Miura and Go Nagata, public management specialist (taxation) of the SDCC Governance Thematic Group; Katharine Thoday, principal environment specialist, SDCC Environment Thematic Group; Takeshi Miyata, climate change specialist (Future Carbon Fund), SDCC; Shu Tian, economist Shu Tian, economist, Macroeconomics Finance Research Division; and Samuel Hill, senior economist, Economic Research and Regional Cooperation Department.

The timely publication of this report was made possible by the valuable coordination and administrative support of Janet Arlene R. Amponin, Anna Liza Cinco, Ken Edward Concepcion, Ketchie Molina, Ghia V. Rabanal, and Ellen May Reynes. Lawrence Casiraya edited the report. Edith Creus did the layout and composition and created the cover design. Jess Macasaet proofread the report and Riel Jane Tanyag handled the page proof check. Their diligent inputs are greatly acknowledged and appreciated.

Executive Summary

Economies around the world are facing an unprecedented shock due to the coronavirus disease (COVID-19) pandemic. Countries are experiencing an increasing need to mobilize resources in response to the immediate crisis and to support economic recovery. This need has come at a time of shrinking fiscal space and heightened debt vulnerabilities. At the same time, the threat of climate change persists, and countries could be tempted to return to carbon-intensive development. However, doing so may result in economies being locked onto a high-carbon emissions pathway that contributes to a future with high risks of severe negative climate impacts on economic and social development.

This paper focuses on how carbon taxes and emissions trading systems (ETS) can support a green recovery and growth, and highlights opportunities to mobilize finance by scaling up international cooperation through Article 6 of the Paris Agreement. It describes the role carbon-pricing initiatives can play in fostering green recovery and growth as well as the transition to a low-carbon economy and achieving a net-zero target in the longer term. With such initiatives, countries can mobilize resources in a timely way and provide much-needed countercyclical support for green recovery.

Carbon Pricing and Its Benefits in the Context of Green Recovery

A green recovery has certain benefits over a traditional fiscal stimulus package: long-run economic multipliers of climate-positive policies have been found to be high, yielding a higher return on investment for government spending. The Asian Development Bank (ADB) emphasizes a fourfold rationale for green recovery, including both economic and environmental elements and responding to the need to (i) build an economy that generates more and better jobs (ii) catalyze capital at scale, (iii) accelerate climate resilience, and (iv) protect the environment and natural capital. A green recovery can also provide important co-benefits such as reduced negative impacts of local pollution on health, infrastructure, and agriculture.

Carbon pricing is a central element of the broader climate policy toolbox and, if designed well, can be utilized in fostering green recovery and growth. Well-designed carbon-pricing policies "internalize" the cost of climate change damages, in part or in full, thereby providing such an incentive. The two primary carbon-pricing instruments are a carbon tax and an ETS both aiming for a predictable and clear carbon-pricing policy signal, either in terms of cost (tax) of future emissions or quantity of emission reductions expected. This is cost-effective in achieving environmental goals and can generate additional revenue which can be used to support green investment. A carbon tax clearly generates revenue for a jurisdiction, but an ETS can do so as well when the jurisdiction sells some or all emissions permits, typically through auctions, rather than allocating them freely (which is also an option and can have advantages early in the lifetime of the ETS).

Growing Momentum of Carbon Pricing in Asia and the Pacific

The use of carbon pricing has steadily increased globally over the past decade. In 2009, 16 carbon-pricing initiatives had been implemented covering about 5% of global GHG emissions. By 2019, 57 initiatives had been implemented covering about 20% of global GHG emissions, with an estimated $45 billion in revenues raised. There are currently 64 carbon-pricing instruments in operation that cover 21.5% of GHG emissions globally, which represents a significant increase from 2020 when only 15.1% of global emissions were covered.

There is a growing momentum for the use of carbon pricing in the Asia and Pacific with six planned and implemented carbon-pricing initiatives at the national level, consisting of four domestic ETS and a carbon tax in two jurisdictions. The region also has successful experience of participating in baseline and crediting mechanisms through the Clean Development Mechanism (CDM) and the Joint Crediting Mechanism (JCM) under the Kyoto Protocol. At the same time, there is an emerging opportunity for mobilizing finance by scaling up international cooperation through Article 6 of the Paris Agreement. Under Article 6.2, countries can mutually agree on a cooperative approach specifically aiming at green recovery.

Designing Carbon Pricing to Support a Green Recovery

In the context of supporting a green recovery, carbon pricing can help safeguard and even create fiscal space by mobilizing revenue that provides much-needed countercyclical support for economic recovery from the COVID-19 pandemic. However, doing so at the time of economic recession requires careful design considerations to ensure that pricing instruments stimulate and do not constrain economic activity and/or growth. Polices, in particular, should be designed to mobilize resources in time to support the post-COVID-19 economic recovery. They should be simple to implement and administer, and they should not just be designed urgently, but also smoothly and sensibly.

A potential way is to start with a low price for carbon, thereby establishing critical policy frameworks and infrastructure and incentivizing participation without imposing price shocks and raising the price of carbon over time to the necessary levels. Revenue generated needs to be earmarked toward climate action or green investments. If designed correctly, and in synergy with a facilitative policy framework, carbon-pricing instruments can be sustained beyond supporting green recovery and, in the longer term, ensure the transition to a low-carbon economy and achieve a net-zero target. The need to design carbon-pricing instruments is timely as advanced economies are seeking to raise ambition within their carbon-pricing jurisdictions, particularly in the form of addressing carbon leakage.

Communicating carbon pricing is key to its implementation, and all the more so during a green recovery. Framing the introduction of carbon pricing relying heavily on concepts such as “price on carbon” and “internalizing the social costs of fossil fuels” may send wrong signals to most audiences under a green recovery phase. Highlighting the positive elements and benefits; the gradual and phased approach to carbon pricing; and the support from government to safeguard the needs of those most impacted, including how revenue is used, would be a better strategy to communicate carbon pricing when implemented to support green recovery and growth.

Carbon Pricing, Green Growth, and the Path toward Net Zero

To support climate mitigation (emissions reduction) actions to support green growth under "normal" economic conditions, mobilized revenues could be used based on a framework that considers the political economy, targets cost-effective abatement opportunities by removing non-price barriers, and channels support to research and development. The idea of such a framework is to reap the benefits from well-designed carbon-pricing instruments to support green growth cost-effectively, while earmarking the revenue for climate action or green developments and away from general spending, such as tax cuts.

Such a framework is also useful in the longer term. There is increasing momentum toward a net-zero target globally as well as in Asia and the Pacific, encouraged by the Paris Agreement. To reach net-zero emissions, the issue for carbon pricing, in addition to designing a framework for using revenues, is the required price level—if a carbon tax is to result in net zero, or what the price will be for regulated entities when approaching net zero. Identifying the highest marginal abatement costs in regulated sectors is one way of estimating the maximum level of allowance in price. A net-zero target is by itself a cap, which means that there needs to be a gradual reduction of the cap of an ETS to zero. Such a zero-emissions cap could include the use of domestic or international offsets.

Policy makers should harness the benefits that carbon pricing can contribute to green recovery and growth. It is crucial to initiate the preparatory work for carbon pricing and to implement an instrument in such a way that it initially generates a low carbon price, to avoid impeding economic growth, but instead to raise price over time. Urgent action on the part of policy makers is needed: evaluating options, consulting stakeholders, and adopting and implementing appropriate carbon-pricing instruments.

Abbreviations

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CBAM	Carbon Border Adjustment Mechanism
CDM	Clean Development Mechanism
DMC	developing member country
ETS	emissions trading system (or scheme)
EU	European Union
GDP	gross domestic product
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
tCO_2e	tons (metric) of carbon dioxide equivalent
IMF	International Monetary Fund
JCM	Joint Crediting Mechanism
NDC	nationally determined contribution
PRC	People's Republic of China

1 Introduction

Economies around the world are facing an unprecedented shock due to the coronavirus disease (COVID-19) pandemic. Countries are experiencing an increasing need to mobilize resources in response to the immediate crisis and to support economic recovery. This need has come at a time of shrinking fiscal space[1] and heightened debt vulnerabilities. At the same time, the threat of climate change persists. Countries will be tempted to follow the 2010-style recipe of carbon-intensive austerity,[2] but doing so may result in economies being locked onto a high-carbon emissions pathway that contributes to a future with high risks of severe negative climate impacts on economic and social development.

Although global emissions have rebounded strongly,[3] countries can still carefully plan their economic recovery to avoid returning to pre-pandemic emission trajectories. The objective should be to create transformational change and work toward ambitious mitigation goals. To do this, there is a need for green recovery plans that restrict greenhouse gas (GHG) emissions. These plans must re-focus attention to address the climate crisis and build resilience, while working toward inclusive economic recovery and sustained growth. Accordingly, there has been a strong call for and a growing momentum to "build back better" and for the COVID-19 recovery to be "green,"[4] taking advantage of the large global stimulus to tackle the ongoing climate crisis and invest in a more sustainable and resilient future.

This publication describes the role carbon-pricing initiatives can play in fostering green recovery and growth, as well as transitioning to a low-carbon economy and in achieving a net-zero target in the longer term. With such initiatives, countries can mobilize resources in a timely way and provide much-needed countercyclical support for green recovery. Clear and predictable carbon price signals in domestic and international markets, which can be achieved through carbon taxes, emissions-trading systems (ETS–cap and trade), and international offset mechanisms can facilitate not just a green recovery but also the cost-effective achievement of climate targets under the Paris Agreement as indicated in the nationally determined contributions (NDCs) of developing member countries (DMCs) of the Asian Development Bank (ADB). Carbon pricing can be effective in raising domestic revenues (through carbon taxes or ETS) as well as mobilizing international carbon finance to incentivize investments in low-carbon advanced technologies (through international offset mechanisms), which can be used

[1] This publication uses a relatively narrow definition of fiscal space, based on recent International Monetary Fund (IMF) reasoning. Fiscal space is defined as room for undertaking discretionary fiscal policy relative to existing plans without endangering market access and debt sustainability. For further reading, please see IMF. 2018. *Assessing Fiscal Space: An Update and Stocktaking*. 15 June. https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/06/15/pp041118assessing-fiscal-space.

[2] Global carbon dioxide (CO_2) emissions fell by 1% during the global financial crisis in 2009, but grew by 4.5% in 2010, above the 5-year average increase of 2.4% (Boden et al., 2017). This rebound was attributed to high levels of government investment in fossil fuel-dependent economic activities intended to stimulate domestic economic activity, coupled with low energy prices (Peters et al., 2012).

[3] International Energy Agency (IEA). 2021. After steep drop in early 2020, global carbon dioxide emissions have rebounded strongly. 2 March. https://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly.

[4] Green in this context encompasses several elements, including sustainable use of natural resources and climate resilience, as well as providing the environmental and economic benefits of such approaches to all segments of society.

to support not just a green economic recovery in the near term, but also sustained green growth and low-carbon transition in the future.[5]

This publication focuses on how carbon taxes and ETS can support a green recovery and growth, and highlights opportunities to mobilize finance by scaling-up international cooperation through Article 6 of the Paris Agreement. However, the landscape of carbon-pricing initiatives is much broader and includes other instruments such as internal carbon pricing, which are not the focus of this paper.

The primary target audience of this paper are policy makers in ADB DMCs who are responsible for mobilizing resources to support the post-COVID green economic recovery, as well as other policy makers involved in the development of GHG emission reduction strategies for green growth. Given the desirability of incorporating climate change and broader green development goals into economic recovery packages, this paper intends to demonstrate the important role that carbon pricing, in particular, could play in green recovery and growth and outline approaches to ameliorating price shocks, while retaining the longer-term environmental and economic benefits of such policy instruments.

[5] V.K. Duggal. 2021. *Carbon Pricing*. Background note prepared for the report Asian Development Outlook 2021: Financing a Green and Inclusive Recovery. Manila: ADB. https://www.adb.org/sites/default/files/institutional-document/691951/ado2021bn-carbon-pricing-developing-asia.pdf

2 Why Is It Advantageous for COVID-19 Recovery to be Green?

As countries transition from "rescue" to "recovery" phase, the greening of recovery has emerged as an imperative for ensuring that national recovery strategies are consistent with the Paris Agreement goals. The arguments justifying green recovery are compelling. A green recovery will not only create better jobs, catalyze capital, and boost the economy, but by supporting low-carbon development, will also protect the environment, improve the quality of life, and strengthen climate and disaster resilience.

Green—and in particular climate-responsible—recovery has certain benefits over a traditional fiscal stimulus package: in many cases, the long-run economic multipliers of climate-positive policies have been found to be high, yielding a higher return on investment for government spending.[6] ADB emphasizes a fourfold rationale for green recovery, including both economic and environmental elements and responding to the need to (i) build an economy that generates more and better jobs (ii) catalyze capital at scale, (iii) accelerate climate resilience, and (iv) protect the environment and natural capital.[7] A green recovery can also provide important co-benefits such as reduced negative impacts of local pollution on health, infrastructure, and agriculture. Integrating the United Nations (UN) Sustainable Development Goals into climate action not only provides development co-benefits, but also ensures effective and efficient use of scarce financial resources and mobilization of sustainable finance.

There is a growing momentum for adopting green recovery strategies and toward promoting carbon neutrality, given their benefits over traditional fiscal stimulus packages. The European Union (EU) has adopted the EU Green Deal to support economic recovery from the pandemic. In Asia, Japan and the Republic of Korea have committed to reduce GHG emissions to net zero by 2050 in pursuing a green recovery. The People's Republic of China (PRC) has also adopted a policy to become carbon-neutral by 2060. Climate-vulnerable countries such as the Maldives have also set highly ambitious targets for achieving carbon neutrality by 2030, if provided with sufficient support. Fiji, Malawi, Nauru, and Nepal aim to meet the 2050 goal or carbon neutrality or net-zero carbon.[8] In the private sector, companies are also increasingly shifting toward carbon neutrality of their entire supply chains. These are important steps forward given that Asia—a major contributor to global economic growth—has also become the largest source of GHG emissions.

Implementing green recovery strategies across developing Asia is challenging, primarily due to unprecedented fiscal pressures. According to the International Monetary Fund (IMF) January 2021 update, the pandemic has caused the global economy to contract by an estimated 3.5% in 2020. ADB forecasts that developing Asia will achieve economic growth of 7.2% in 2021 and moderating to 5.4% in 2022, although growth will remain

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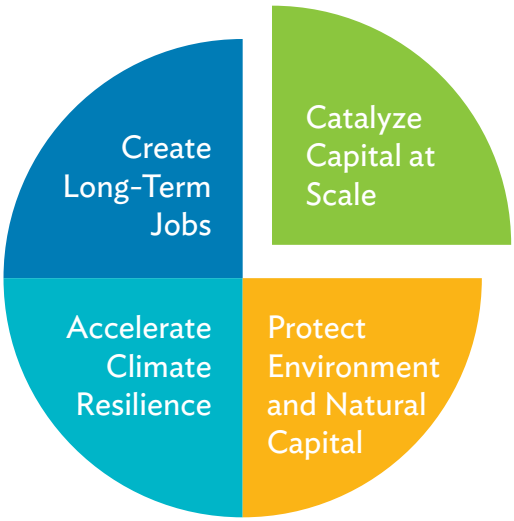
6 C. Hepburn et al. 2020. Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change. *Oxford Review of Economic Policy*. 36(1). pp. 359–381.

7 ADB. 2020. *Green Finance Strategies for Post COVID-19 Economic Recovery in Southeast Asia*. Manila. https://www.adb.org/sites/default/files/publication/639141/green-finance-post-covid-19-southeast-asia.pdf.

8 E. Ares, A. Broughton, and E. Kirk-Wade. 2021. *Estimates Day Debate: COP26 Climate Conference*. Briefing produced ahead of the Estimates Day debate in the Commons Chamber. United Kingdom. 09 March. https://researchbriefings.files.parliament.uk/documents/CDP-2021-0033/CDP-2021-0033.pdf.

Figure 1: A Fourfold Rationale for Green Recovery



Source: Asian Development Bank.

below what was envisioned prior to the pandemic.[9] The combination of increasing expenditures associated with managing COVID-19-related developments and a collapsing revenue base due to a sharp contraction in economic activity and stimulus measures has put severe pressure on the fiscal space. This pressure increases the risk that governments will prematurely withdraw critically needed fiscal support for managing the COVID-19 pandemic and supporting economic recovery. Mobilizing resources in a way that creates fiscal space can play a critical role in addressing this fiscal challenge and securing a better future. Diffusing mature low-carbon technologies while increasing access to innovative and advanced low-carbon technologies is also key to achieving green economic recovery and the targets expressed in NDCs.

Countries will need to boost both domestic and international sources of finance to tackle the challenges of pursuing a green recovery. The current crisis presents an unprecedented opportunity to put in place policies that create much-needed fiscal space, while putting the economy on a sustainable growth path for the long term. How can countries proceed to realize this opportunity? A significant first step will involve putting a price on carbon.

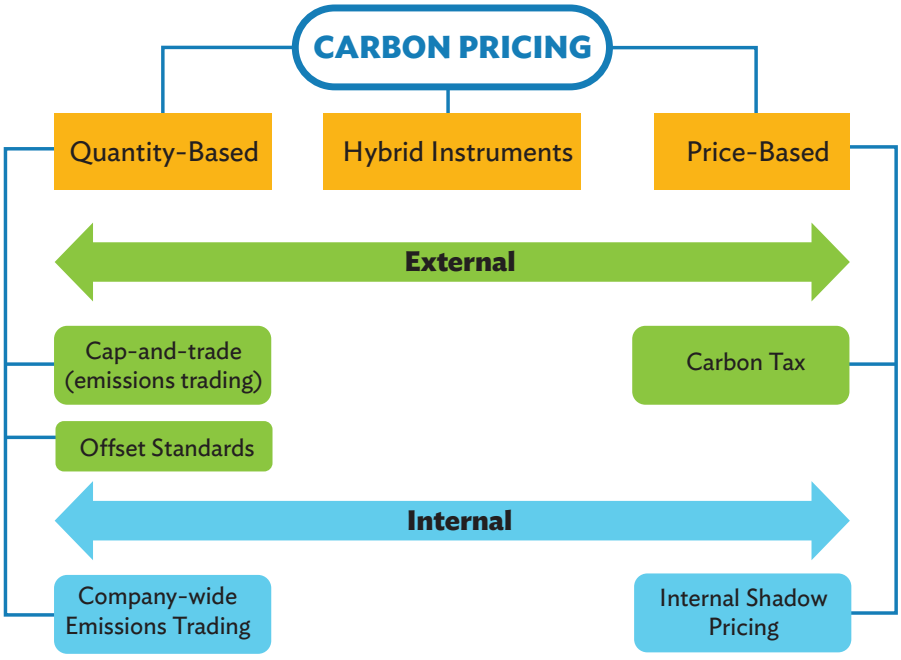
[9] ADB. 2021. *Asian Development Outlook 2021 Supplement: Renewed Outbreaks and Divergent Recoveries*. July. https://www.adb.org/sites/default/files/publication/715491/ado-supplement-july-2021.pdf.

3 What is Carbon Pricing?

Climate change, caused by increased concentrations of GHGs in the atmosphere resulting from human activities, creates widespread and protracted damage—to the environment, to economies, and to society. Because the cost of such damage is typically not incorporated into the price of goods and services that result in GHG emissions, there is no economic incentive to reduce emissions. The basic premise behind carbon pricing is that well-designed carbon-pricing policies can be used effectively to "internalize" the external cost of damage caused by climate change, in part or in full, thereby providing such an incentive.

Figure 2 illustrates the landscape of what is typically considered as direct carbon-pricing instruments. The term "internal carbon pricing" is typically used to represent pricing within a company, i.e., not being a response to the government imposing carbon pricing, which is referred to as "external" in Figure 2.[10] GHG emissions can

Figure 2: Landscape of Direct Carbon-Pricing Instruments



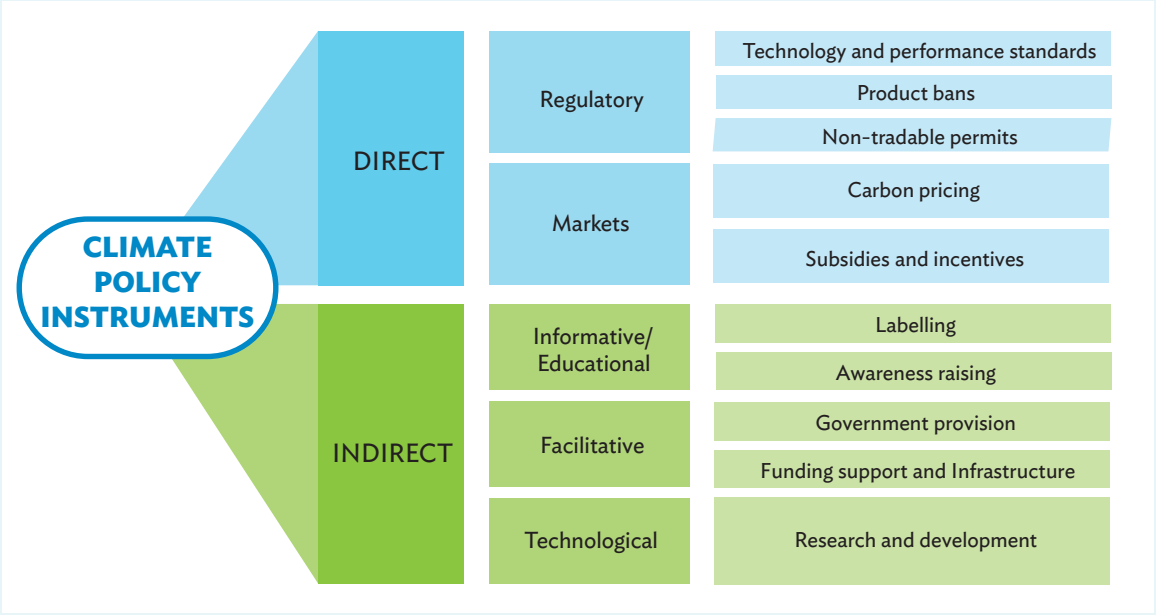
Source: Asian Development Bank.

[10] This report does not elaborate on the role of internal carbon pricing, but see Ecofys, The Generation Foundation, and Carbon Disclosure Project. 2017. How to guide to corporate internal carbon pricing – Four dimensions to best practice approaches. Prepared under the Carbon Pricing Unlocked partnership between the Generation Foundation and Ecofys in collaboration with Carbon Disclosure Project.

also be priced somewhat less directly using carbon offsetting or crediting. Fossil fuel taxes and, in some cases results-based finance, can also price carbon indirectly. From the perspective of a policy maker for the broader economy, however, there are two primary carbon-pricing policy instruments: carbon taxes and emissions trading systems (ETS–cap and trade), which are also the focus of this paper. Carbon pricing is also just one part of the overall climate policy architecture as highlighted in Box 1.

Box 1: Carbon Pricing in the Overall Climate Policy Architecture

Although carbon pricing is widely seen as the most cost-effective solution to have an economy-wide impact on emissions, it is still not a silver bullet. Carbon pricing is part of the overall climate policy architecture and given policy instruments have different effects, features, and applicability, it is important to ensure that different policies work together and toward common objectives by avoiding detrimental policy overlaps and avoiding policy failure. The figure below shows where carbon pricing falls in the overall climate policy architecture.



To ensure that carbon pricing plays a key role in the climate policy package, policy makers could reflect on what the system is designed for and expected to do. For example, the key role of an emissions trading system could be to drive emissions reductions, but it could also provide a backstop for other policies. The primary goal of carbon pricing is to reduce greenhouse gas (GHG) emissions cost-effectively, but it can also provide other benefits. For instance, the outcomes of the carbon-pricing instrument could be other than initially expected, such as becoming an instrument for raising revenue to invest in low-carbon technology in sectors other than those covered by the system.[a] Another key aspect is to ensure that the carbon-pricing instrument does not create redundancy in the policy package. Policy makers should assess whether the additional GHG abatement or other benefits from each policy are sufficient to justify the additional difficulty of including it in an already complex package. The costs and benefits will be different in the presence of other policies; so policies, including carbon pricing, need to be assessed as a package and not separately.[b] While it is difficult to achieve perfect results from the start, by allowing for policy review and continuously making improvements, a policy mix will improve over time.

[a] International Energy Agency (IEA). 2020. *Implementing Effective Emissions Trading Systems*. Paris. https://www.iea.org/reports/implementing-effective-emissions-trading-systems

[b] C. Hood. 2013. Managing interactions between carbon pricing and existing energy policies. Guidance for Policymakers. *Insight Series* 2013. Paris: IEA.

Source: Asiand Development Bank.

With a carbon tax, a jurisdiction (e.g., a regional, national, or provincial governing entity) imposes a fee per unit of emission, usually a metric ton of carbon dioxide equivalent (tCO2e).[11] The fee is typically uniform across the economy or regulated sector, and it typically increases over time to continue reducing total emissions. In an ETS, a jurisdiction imposes a "cap" (or limit, usually per year) on total emissions across an economy or selected sectors. The government then issues emissions permits (or "allowances") to the entities regulated within the ETS (e.g., firms or installations), equivalent in aggregate to the cap. These allowances are allocated across the regulated segment of the economy—either through a provision of receiving allowances according to their historical emissions in a base year or base period, commonly referred to as "grandfathering,"[12] or by auctioning—and may then be bought and sold by regulated entities.[13] At the end of the compliance period (again, usually per year), each regulated entity must submit to the government a number of permits equal to its measured emissions for that period, or face a fine or other sanction.

Carbon taxes and ETS are known as "flexible" policy instruments, in that regulated entities may comply in a variety of ways. In a tax regime, a regulated firm may choose to (i) carry on with business as usual and pay the tax; (ii) reduce production and corresponding emissions and pay less tax; or (iii) adopt new technology and/or processes that enable it to maintain production but in a less emissions-intensive manner, and thereby effectively pay less tax per unit of output. The choices that face a regulated firm in an ETS are very similar, but instead of paying a tax at the end of the compliance period, a regulated entity submits permits equivalent to its emissions.

Importantly, individually regulated firms or entities will typically choose the lowest-cost compliance option to achieving their goals. Therefore, a market-based approach will achieve an emission reduction objective at the lowest cost, in aggregate across the regulated segment of the economy. This is in contrast to a non-market-based policy approach, such as a performance standard, in which, for instance, all power plants of a particular class must emit below a certain level, regardless of how costly it is to reduce emissions (where cost depends on the age of its technology and other factors).

The major difference between carbon taxes and emissions trading is that in an ETS, the price of the permits varies—determined by supply and demand for those permits—but the maximum quantity of emissions is fixed, by the cap. With a tax, the opposite is true: the price is fixed, but the quantity of emissions is not. Under an ETS, a firm has options that it does not have if taxed: it may buy permits on the market if it anticipates being short at the end of the compliance period; or it may sell permits and gain revenue if it anticipates that it will have surplus permits. The choice between instruments depends on a jurisdiction's goals, needs, and preferences—and that designing the system well can be more important than the choice between systems.[14]

11 A carbon dioxide equivalent or CO2 equivalent, abbreviated as CO2-e is a commonly used metric measure used to compare the emissions of various greenhouse gases on the basis of their global-warming potential by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential. See more at Eurostat. n.d. Glossary: Carbon dioxide equivalent. *Eurostats Statistics Explained*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Carbon_dioxide_equivalent#:~:text=A%20carbon%20dioxide%20equivalent%20or,with%20the%20same%20global%20warming (accessed 15 January 2021).

12 For more on allocation under an ETS, see International Carbon Action Partnership. Allocation. https://icapcarbonaction.com/en/allocation.

13 In practice, specific design elements of an emissions-trading system—including the method of permit allocation—varies across systems. One of the more important design choices involves the point of regulation: "upstream" or "downstream." A tax system or ETS is fully upstream if the carbon content of primary fossil fuels is regulated, as these fuels enter the economy, rather than the emissions directly. With such a fully upstream economy, almost the entire economy can be covered by the tax or ETS.

14 R.N. Stavins. 2019. Carbon Taxes vs. Cap and Trade: Theory and Practice. *Harvard Project on Climate Agreements*. https://www.belfercenter.org/publication/carbon-taxes-vs-cap-and-trade-theory-and-practice.

> There is no perfect political–economy solution to climate change, which wraps economic efficiency in a politically convenient package. But the world could do much better than the current policies. There is a debate among economists as to the proper way of implementing carbon pricing. The problem is complex and economists can reasonably disagree on the specifics. And so the jury is still out. But this division among economists is really second order as any of the proposed implementation definitely dominates the current approach.
>
> Jean Tirole, Noble Prize Laureate 2014[15]

Carbon-pricing regimes that directly price emissions require robust systems of measurement, reporting, and verification of emissions and effective compliance processes. Putting in place administrative and oversight systems for such instruments requires significant institutional and human capacity that can take several years to develop. The complexity of the measurement, reporting, and verification system depends largely on the specific policy instrument being applied. In general, carbon taxes (whether a broad carbon tax, fuel tax, or product tax) can be adopted with relatively simple oversight arrangements and, potentially, utilizing existing arrangements and capacities, making it possible to deploy quickly.[16]

Finally, allowing regulated entities to use carbon credits generated outside the compliance boundary of an ETS can create flexibility for installations in compliance sectors.[17] Carbon credits—often referred to as "offsets" or "offset credits"—are generated through investments that reduce emissions relative to a projected or modeled baseline value in the future, and are generated outside the compliance boundary. In an ETS proper, emissions are reduced relative to an actual, absolute amount of emissions in a previous year.

Examples of carbon-credit systems include the Kyoto Protocol's Clean Development Mechanism (CDM), Japan's Joint Crediting Mechanism (JCM), and the Chinese Certified Emission Reduction scheme. The Paris Agreement includes a provision—under Article 6.4—that is evolving into a centrally governed carbon-credit system that will likely absorb some components of the CDM. Article 6.2, which offers a decentralized approach to international carbon market cooperation, may also include carbon-credit systems developed on bilateral or plurilateral bases. The JCM is an example of a decentralized mechanism that will be subject to Article 6.2 guidance if used to generate internationally transferred mitigation outcomes.[18]

When an ETS allows carbon credits to be used as substitutes for ETS allowances for compliance purposes, limitations are usually imposed (usually expressed as a maximum percentage of a regulated entity's compliance obligation). The EU ETS allowed CDM credits to be used for compliance purposes for several years. The Korea Emissions Trading Scheme allows for the use of credits generated internationally with Korean involvement representing savings made overseas and forestry management projects.[19]

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15 J. Tirole. 2016. *Carbon Pricing for a Climate Coalition*. 10 June. Toulouse School of Economics and Institute of Advanced Studies in Toulouse.

16 Systems for collecting taxes are already in place in most countries and can be employed in the service of new carbon taxes. This affords carbon taxes an advantage over ETS. ETS commonly require novel institutional capacity, for example, for establishing and operating a trading platform or exchanges.

17 In principle, carbon credits could also be used to offset carbon tax obligations. This is somewhat more complex in practice, however, as credits are denominated in tons of GHGs, while taxes are normally denominated in a currency.

18 K. Koatkutsu et al. 2016. Operationalizing the Paris Agreement Article 6 through the Joint Crediting Mechanism (JCM): Key Issues for Linking Market Mechanisms and the Nationally Determined Contributions (NDCs). *Institute for Global Environmental Strategies Discussion Paper*. May. https://iges.or.jp/en/pub/operationalizing-paris-agreement-article-6.

19 ADB. 2018. *The Korea Emissions Trading Scheme: Challenges and Emerging Opportunities*. Manila. https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf.

4 The Benefits of Carbon Pricing

Carbon pricing is an integral element of the broader climate and energy policy architecture and can be implemented in tandem with other policies such as the removal or phasing out of fossil fuel subsidies. When designed and implemented appropriately, carbon pricing provides many benefits. Clear and predictable carbon-price signals in domestic and international markets can enhance the economic competitiveness of low-carbon technologies and help countries achieve climate change targets articulated in their respective NDCs cost-effectively. Carbon pricing also provides environmental effectiveness.[20] Carbon pricing can be effective in raising domestic revenues (carbon tax or ETS) as well as mobilizing international carbon finance to incentivize investments in advanced low-carbon technologies (international offset mechanisms). Carbon pricing disincentivizes the use of fossil fuels, making deployment of renewables more attractive. Robust carbon-pricing instruments can thereby drive an energy transition away from fossil fuels by accelerating the diffusion of advanced low-carbon technologies, stimulating greater deployment of renewable energy technologies and e-mobility, and incentivizing fuel switching and the use of different forms of non-fossil fuel energy resources. In 2020, a large empirical study—using 2 decades' worth of data from 142 countries, of which 43 had a carbon price—showed that countries with carbon prices, on average, have annual carbon dioxide emission growth rates that are about two percentage points lower than countries without a carbon price, after taking many other factors into account.[21]

Carbon finance mobilized through bilateral, regional, and international carbon markets can alleviate financial barriers to and facilitate cross-border trade of renewable-based electricity, and thereby increase the share of renewables in the overall electricity supply mix and foster regional integration. The larger the geography over which coherent carbon pricing is used, the higher the likelihood that regional cooperation and solutions will be pursued. For example, ensuring interconnectivity between geographic locations and different energy systems can greatly support the deployment of renewables. Several studies confirm the importance of cross-border electricity trade in increasing the effective capacity factor of intermittent plants in the context of a growing share of renewables in the power sector.[22]

Carbon pricing can also play a role in improving energy security and reducing vulnerability to international energy price shocks. Dependence on fossil fuel imports, which are usually denominated in foreign currency, exposes countries that are net-energy importers to financial volatility. Implementing carbon pricing can incentivize shifts away from imported fossil fuels toward renewable energy sourced from domestic or regional markets. Such a transition can reduce reliance on foreign currency, through pricing in local currency for domestic markets and promoting energy barter agreements with regional trade partners, such as the Association of

[20] A. Baranzini et al. 2016. Seven reasons to use carbon pricing in climate policy. *Centre for Climate Change Economics and Policy Working Paper*. No. 253. United Kingdom: London School of Economics and Political Science. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2016/02/Working-Paper-224-Baranzini-et-al.pdf.

[21] R. Best, P.J. Burke, and F. Jotzo. 2020. Carbon Pricing Efficacy: Cross-Country Evidence. *Environmental and Resource Economics*. 77(1). pp. 69–94.

[22] See for instance F. Chen et al. 2019. Long-term cross-border electricity trading model under the background of Global Energy Interconnection. *Global Energy Interconnection*. 2 (2). pp. 122–129; and, M. Joshi, D. Hurlbut, and D. Palchak. 2020. *Cross-Border Electricity Trading and Renewable Energy Zones*. Government of the United States, Office of Scientific and Technical Information. https://www.osti.gov/biblio/1659966.

Southeast Asian Nations (ASEAN) Power Grid initiative.[23] A more detailed description of the seven key benefits of carbon-pricing instruments is provided in the table.

Benefits of Carbon Pricing

Carbon pricing alters relative prices, causing firms and consumers to internalize global warming impacts.	Carbon pricing changes the relative prices of goods and services in accordance with the polluter pays principle, by internalizing the cost of negative environmental and social impacts of climate change. The price signals created through carbon pricing lead firms, consumers, and investors to incorporate the social and environmental costs associated with their market decisions. Those decisions, in turn, can influence the quantity of greenhouse gas (GHG) emissions generated throughout product life cycles, from resource to waste. As a result, the entire economy can become less carbon-intensive, by incentivizing consumers and producers to adjust their decisions to reflect the climate externality. To obtain the same result with non-market-based instruments would require regulation that reflects complete information about emissions and abatement options for all polluting processes and behaviors, and detailed regulatory controls. This is extremely difficult to achieve and involves huge governance costs.
Carbon pricing addresses the heterogeneity of emitters, reducing overall emissions and the cost of abatement.	Compared to other types of policy instruments, carbon pricing can address the vast heterogeneity of GHG emitters, thus helping to minimize the cost of pollution control. Heterogeneity results from firms providing diverse goods and services using a range of different technologies and inputs, and thus causing different quantities of emissions per unit of output. This translates into unequal marginal costs across firms of mitigating GHG emissions. When faced with paying a price for polluting, firms generally attempt to maximize profits by choosing the cheapest production route (i.e., minimizing costs). That involves, within the limits of capital constraints, reducing their emissions until achieving additional reductions becomes more expensive than paying the carbon price. When the cost of mitigation is passed on to consumers through the price of goods and services, the firms whose total cost of mitigation measures, together with the lowest carbon price paid, become more competitive. Hence, a clear carbon-price signal shifts both production and consumptive behaviors away from activities causing GHG emissions. No other policy instrument can achieve this outcome.
Global carbon pricing curtails emissions leakage between countries.	GHG emissions leakage between countries, i.e., the cross-border movement of emission sources, occurs when policy changes cause shifts in comparative advantages that alter international trade patterns. One example of this is when pollution-intensive industries relocate internationally, driven by relative cost increases in countries with stricter regulations. There is a risk of this when countries adopt carbon pricing individually. An international carbon price covering the same sectors in all countries would abate this risk.
Carbon pricing decentralizes policy, reducing regulators' need for information.	Carbon pricing is consistent with flexibility and autonomy of choice, allowing emitters to freely change their behavior to reduce their costs. They can opt for emitting and paying any charges or taxes associated with emissions, or for undertaking a variety of activities, immediately or after relevant investments, to avoid emitting. Carbon pricing thus decentralizes policy, with associated low information requirements and administrative costs on the part of the regulator.
Carbon pricing acknowledges that most consumers respond more consistently to price signals than to environmental information.	Even for environmentally conscious consumers, it is challenging to translate environmental information into climate-adjusted purchasing decisions. It is, moreover, unthinkable that one can voluntarily contribute to all public goods in the world. Carbon pricing enables consumers to respond consistently, lifting some of the information burden from their shoulders by incentivizing low-carbon consumption (and production) through clear price signals.

Source: A. Baranzini et al. 2017. Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *Wiley Interdisciplinary Reviews: Climate Change*. 8(4). p. e462.

[23] ASEAN. Enhancing ASEAN Connectivity. Initial Pipeline of ASEAN Infrastructure Projects. https://asean.org/?static_post=enhancing-asean-connectivity-initial-pipeline-asean-infrastructure-project.

There are also general criticisms of the efficacy of carbon-pricing schemes. One common criticism is that carbon-pricing schemes carry enormous political cost. Carbon pricing can indeed face political resistance, but it is important to note that this holds true for all restrictive climate policies.[24] Scholars have long argued that political responses to carbon-pricing schemes have largely been, and will continue to be, a function of issues and structural factors that transcend the scope of environmental and climate policy. Such political resistance is to be expected, particularly during difficult economic times.[25] Other criticisms include that carbon-pricing frames climate change as a market failure rather than a fundamental system problem, and that they focus on efficiency over effectiveness and on optimization over transformation.[26] While there are merits to these arguments, they do not downplay the benefits highlighted above that carbon-pricing instruments can provide. What they do imply is that carbon-pricing instruments cannot fully mitigate climate change independently: they need to be complemented by other policy instruments, as part of a broader national climate policy architecture.

Recognition of the benefits of carbon-pricing instruments is clearly reflected in the growing adoption by countries, including those in the Asia and Pacific region.

Box 2: Emerging Opportunities and Benefits under Article 6 of the Paris Agreement

The process of scaling up international cooperation under Article 6 of the Paris Agreement is creating emerging opportunities for mobilizing finance, by allowing countries to work cooperatively to achieve their emission reduction goals. There are, in fact, two distinct cooperative market-based mechanisms under Article 6. Article 6.4 provides for a centralized mechanism that is evolving into a form of international crediting system similar to previous market mechanisms under the Kyoto Protocol. Article 6.2 allows countries to transfer "mitigation outcomes" for achieving and raising ambition of their nationally determined contributions (NDCs). The approaches emerging under Article 6.2 and the new mechanism under Article 6.4 can potentially advance economic recovery and growth by generating revenue and, perhaps, finance, to support investment.

It has been estimated that international cooperation under Article 6 has the potential to reduce the total implementation cost of countries' NDCs by more than $250 billion per year in 2030. Furthermore, if countries are motivated to invest these cost savings in enhanced ambition, then Article 6 could facilitate additional abatement under the Paris Agreement by 50% or ~5 gigatonnes of carbon dioxide per year (GtCO2/year) in 2030. [a]

Project-based crediting mechanisms have an established track record in generating revenue and delivering emissions reductions through international cooperation under cap-and-trade schemes. Under the Kyoto Protocol, developing-country stakeholders could generate internationally tradable emission reduction credits through the Clean Development Mechanism. The Joint Crediting Mechanism (JCM), pioneered by the Government of Japan, is another example of a groundbreaking crediting initiative that nurtures bilateral cooperation on reducing greenhouse gas emissions by mobilizing resources to support investment in low-carbon technologies. Project-based mechanisms such as the JCM can play a critical role in the demonstration of new technologies and approaches, while removing barriers to realizing emissions reductions. However, to be relevant for supporting economic stimulus, crediting mechanisms would need to be of some scale as well as incorporate upfront financing. Under the Paris Agreement's Article 6.2, countries will be able to cooperate on generating emissions reductions from sector- or economy-wide initiatives through activities that support sustainable development and undertaken based on mutually agreed rules that ensure environmental integrity, transparency, and robust accounting. Under Article 6.2, countries can mutually agree on a cooperative approach specifically aiming at green recovery.

[a] J. Edmonds et al. 2019. *The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges*. https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

Source: Asian Development Bank.

[24] J.V.D. Bergh and W. Botzen. 2020. Low-carbon transition is improbable without carbon pricing. *Proceedings of the National Academy of Sciences*. 117(38). pp. 23219–23220.

[25] J.E. Aldy and R.N. Stavins. 2012. The promise and problems of pricing carbon: Theory and experience. *The Journal of Environment & Development*. 21(2). pp. 152–180.

[26] D. Rosenbloom et al. 2020. Opinion: Why carbon pricing is not sufficient to mitigate climate change—and how "sustainability transition policy" can help. *Proceedings of the National Academy of Sciences*. 117(16). pp. 8664–8668.

5 How Can Carbon Pricing Generate Revenue?

Carbon taxes clearly generate public revenue. Such taxes can be designed to simply create additional contributions to government revenues, or can be designed to be revenue-neutral by earmarking tax revenues for use in subsidies directed either toward specific entities (sector stakeholders or consumers) or toward specific types of investment (such as investments in renewable energy production capacity). An ETS can also generate public revenue when the jurisdiction sells some or all emissions permits. This is typically done through auctions. Allocating emissions permits free of charge in the initial phase of implementing an ETS is a common approach used to ease the transition toward a more encompassing carbon-pricing policy. Over time, the share of emissions permits sold by authorities can be increased, thereby increasing revenue. Given that a carbon tax as well as an ETS can be designed to yield the same emissions and put the same price on pollution, they can also raise identical amounts of revenue.[27] These revenues can cushion deficit spending during a recession and recovery, and support debt repayment in the longer term for green growth. Carbon-pricing schemes create fiscal space. It is therefore valuable for policy makers in the Asia and Pacific region to draw key lessons from the decades of experience with carbon taxes and cap-and-trade systems such as ETS.[28]

How to use the revenue is often discussed under three categories:[29] (i) spending on complementary environmental policies, (ii) cushioning adverse impacts of carbon pricing, and (iii) improving the tax-benefit system as a whole. Whereas the two first categories are directly related to carbon pricing and climate or environmental policy, in general, the third category refers to revenues that can be used to reduce outstanding public debt or spent on social objectives that have nothing to do with climate change or environmental policy. Improving the tax system is something that may need to be addressed at any time, by any government, regardless of the climate policy (footnote 29). At the same time, a reform of the tax system may open for the introduction of carbon pricing.

How revenues are used may have consequences for the propensity by different stakeholders to accept carbon-pricing instruments. Revenues can be used to pursue environmental, economic, and social objectives. While it can be included in the general government budget, revenues from carbon-pricing instruments are instead often used to fund specific objectives.[30] Decisions about revenue allocation are vital as these revenues can help shift the narrative on carbon pricing from burden to benefit.[31]

In the United States, the Regional Greenhouse Gas Initiative is one example of how revenues are used for specific objectives. The initiative caps emissions from the power sector in 10 states. These states sell nearly all emission allowances through auctions and invest proceeds in energy efficiency, renewable energy, and other

[27] M.N.O. Keohane and S.N. Olmstead. 2016. *Markets and the Environment*. Washington, DC: Island Press. p. 162. https://islandpress.org/books/markets-and-environment-second-edition.

[28] For more information on experiences with carbon pricing, see footnote 14.

[29] A. Bowen. 2015. Carbon pricing: how best to use the revenue? *The Grantham Research Institute on Climate Change and the Environment Policy Brief*. November. London: London School of Economics and Political Science.

[30] World Bank. 2019. *Using Carbon Revenues*. Washington, DC.

[31] M. Vaidyula and E. Alberola. 2016. *Recycling carbon revenues: transforming costs into opportunities*. 31 May. Paris: Institute for Climate Economics.

consumer benefit programs.[32] Both renewable generators, but also utilities with no electricity-generating capacity (only transmission and distribution lines), benefited from energy efficiency investments that would come from auction revenues.[33] In this case, revenues are partly fed back into the regulated sector, the electricity sector, which is one way of ensuring acceptance from affected stakeholders.

Removing existing monetary or financial subsidies for carbon-intensive products (such as fossil fuels) can be the fiscal equivalent of imposing a carbon tax. This would generate access to public revenue by reducing public expenditures. The reduced budgetary burden would create fiscal space. Reducing fossil fuel subsidies would normally be expected to result in emission reductions. Therefore, such a policy shift could generate a revenue stream from carbon credits as part of a sector or policy crediting approach under Article 6.2. Policy crediting is one possible way to scale up carbon emission reductions through crediting mechanisms, by stimulating change at the system or sector levels. This is a development foreseen and desired by many countries, also reflecting the desire to give greater responsibility to the participating countries in designing a carbon-market mechanism, while moving beyond the crediting of single mitigation projects to transformative and sector-based cooperation. Article 6.2 provides for these types of approaches which means that policy interventions can be monetized through the export of carbon credits, given that the emission reductions can be duly attributed to the policy intervention.

Although carbon pricing can structurally provide a large source of revenue, its tax/price base gets eroded over time with an overall reduction of GHG emissions in the jurisdictions.[34] However, the revenue generated through carbon pricing does not necessarily have to erode, because the tax/price can be adjusted over time (until an economy becomes emissions-free). This further iterates the importance of design considerations when adopting carbon-pricing instruments. In cases where few abatement options exist, a carbon tax can generate income for a long period of time. In Asia and the Pacific, there is a larger share of ETS, and there is limited use of auctioning of emissions permits. Regulators in the region generally rely on either allocating the permits based on the share of past emissions in regulated sectors or on the performance benchmarks. Moving forward, public revenues will increase in jurisdictions in the region where ETS has been implemented, as the use of auctioning becomes more widespread.

Carbon-pricing instruments can be adopted and implemented in such a way that they initially generate a low carbon price, thereby establishing critical policy frameworks and infrastructure and incentivize participation without imposing price shocks (on regulated firms or installations and for consumers). The revenue that can be generated from this approach can be channeled to support green recovery by boosting consumption and investment or be used to create fiscal space. While the choice between these approaches is a political one (footnote 34), it is imperative to channel the revenue generated from carbon-pricing instruments into the green sector to ensure carbon pricing can foster a green recovery. In the long run, it is important to ensure an optimal price on carbon which reflects climate policy objectives. Accordingly, amplifying the carbon price to reach the optimal level is needed to increase the impact and efficacy of the instrument, including moving toward a global price on carbon to reduce carbon leakage. According to the International Monetary Fund (IMF), a carbon price of $70/tCO2e is needed to generate revenues equivalent to around 2%–4% of gross domestic product (GDP) in major developing countries, including India, the PRC, and South Africa.[35] The mechanism through which carbon pricing can generate revenue is not just suitable for supporting a green recovery, but also for supporting green growth as illustrated in Figure 3.

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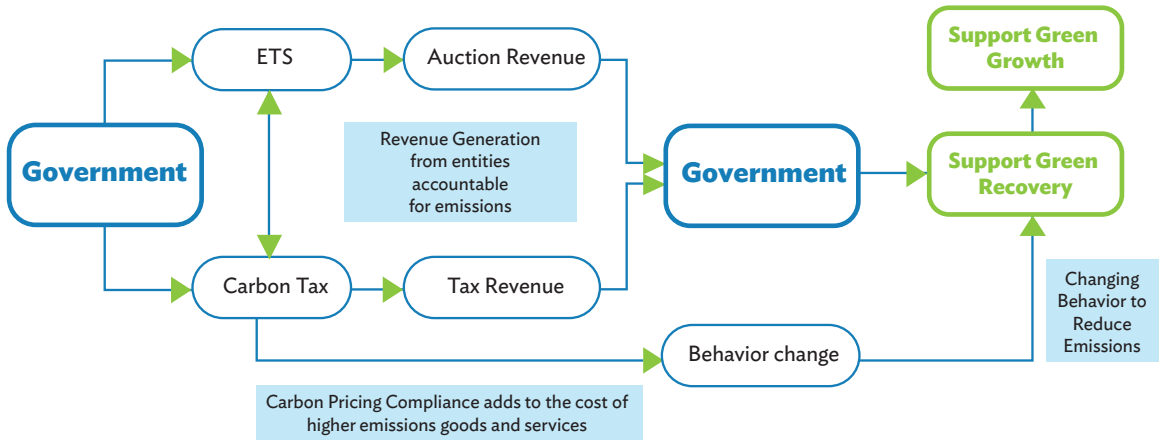
32 The Regional Greenhouse Gas Initiative. RGGI Overview and Design. https://www.rggi.org/program-overview-and-design/elements

33 B. Huber. 2013. How Did RGGI Do It: Political Economy and Emissions Auctions. *Ecology LQ*. 40:59. Available at: https://scholarship.law.nd.edu/law_faculty_scholarship/473.

34 S.F. Burke and A. Bowen. 2020. Pricing carbon during the economic recovery from the COVID-19 pandemic. *Grantham Research Institute on Climate Change and the Environment Policy Brief*. May. https://www.lse.ac.uk/granthaminstitute/publication/pricing-carbon-during-the-economic-recovery-from-the-covid-19-pandemic/.

35 IMF. 2019. Fiscal Policies for Paris Climate Strategies-from Principle to Practice. *International Monetary Fund Fiscal Affairs Department Policy Papers*. No. 19/010. Washington, DC: International Monetary Fund.

Figure 3: How Carbon Pricing Can Generate Revenue to Support Green Growth and Recovery



ETS = emissions trading system (or scheme).
Source: Asian Development Bank.

6 Growing Momentum of Carbon Pricing in Asia and the Pacific

The use of carbon pricing has steadily increased globally over the past decade. In 2009, 16 carbon-pricing initiatives had been implemented covering about 5% of global GHG emissions. By 2019, 57 initiatives had been implemented covering about 20% of global GHG emissions, with an estimated $45 billion in revenues raised.[36] There are currently 64 carbon-pricing instruments in operation that cover 21.5% of GHG emissions globally, which represents a significant increase from 2020, when only 15.1% of global emissions were covered.[37] From these, six carbon pricing initiatives have been implemented or are emerging at the national level in Asia and the Pacific (Figure 4), while 20 of 41 ADB DMCs have expressed interest[38] in using market-based mechanisms in their NDCs to achieve national emission reduction targets.

Despite the impacts that COVID-19 has had on economies and carbon-pricing schemes across jurisdictions, there is positive momentum in Asia and the Pacific. Japan and Singapore are the only countries in the region that currently employ a carbon tax. Nonetheless, the region has a long track record of using excise, sales, and import taxes for fossil fuels and other carbon-intensive products to support general revenue mobilization. The Organisation for Economic Co-operation and Development (OECD) tracks environmentally-related taxes, going beyond a typical carbon tax whose tax base is carbon emissions, and covers four subsets which include energy taxes, transport taxes, pollution taxes, and resources taxes (Box 3).

This highlights that there is significant relevant experience in the region with environmentally-related taxes as well as taxes on carbon-intensive products, which can be built upon to implement taxation more explicitly and strategically as a carbon-pricing instrument. In fact, the COVID-19 pandemic has severely weakened tax revenues, reflecting tax stimulus measures and lowered activity that affected tax buoyancy. Pandemic responses have also led to increased public expenditures, which increase the urgency of strengthening taxes. Utilizing existing tax bases and moving toward an explicit carbon price can help countries achieve a reduction in GHG emissions, while establishing a robust tax revenue base to help fund public spending and improve fiscal sustainability.

[36] World Bank. 2020. State and Trends of Carbon Pricing 2020. https://openknowledge.worldbank.org/handle/10986/33809. For more information, the World Bank annual report covers both emissions-trading and tax systems. The following annual reports, while valuable, cover only emissions trading: International Carbon Action Partnership. 2020. Emissions Trading Worldwide: Status Report 2020. https://icapcarbonaction.com/en/icap-status-report-2020; and International Emissions Trading Association. 2020. 2050 Vision: 2020 Greenhouse Gas Market Report. https://www.ieta.org/GHG-Market-Report#Twenty_Twenty.

[37] World Bank. 2021. State and Trends of Carbon Pricing 2021.https://openknowledge.worldbank.org/handle/10986/35620

[38] B. Amarjargal et al. 2020. Achieving Nationally Determined Contributions through Market Mechanisms in Asia and the Pacific. *ADB Sustainable Development Working Paper Series.* No. 64. Manila: Asian Development Bank. Please note that this calculation is based on targets outlined in the first (pre-2020) NDC communicated to the UN Framework Convention on Climate Change.

Figure 4: Carbon Pricing in Asia and the Pacific

Carbon Pricing for Asia and the Pacific[a]

▶ Total GHG Emissions (excluding LULUCF) ▶ Coverage (% of emissions covered)[b] ▶ Sectors Covered ▶ Number of Liable Entities (optional) ▶ Carbon Price

PRC National ETS — Established February 2021

- ▶ 12,301 $MtCO_2e$ (2014) ▶ 4,920.4 $MtCO_2e$ (40%)
- ▶ Power sector (including combined heat and power as well as captive power plants of other sectors).

  The scope is expected to be gradually expanded to cover seven other sectors in addition to power: petrochemical, chemical, building materials, steel, nonferrous metals, paper, and domestic aviation. There is no specific timeline for this expansion. Threshold: Entities with annual emissions of 26,000 tCO_2 in any year over the period 2013-2019.
- ▶ 2,225 entities (2021)
- ▶ RMB 51.23 ($ 7.92) (closing price of first day of trading)[c]

Beijing — Established November 2013

- ▶ 188.1 $MtCO_2e$ (2012) ▶ 84.6 $MtCO_2e$ (45%)
- ▶ Industrial and non-industrial companies and entities, including electricity providers, heating sector, cement, petrochemicals, other industrial enterprises, manufacturers, service sector, public transport, and domestic aviation. (Threshold: >5,000 tCO_2/year, considering both direct and indirect emissions.)
- ▶ 831 companies (2019) 14 aviation entities and 634 other entities have mandatory reporting but no surrender obligations.

Chongqing — Established June 2014

- ▶ 156 $MtCO_2e$ (2018) ▶ 96.7 $MtCO_2e$ (62%)
- ▶ Power, electrolytic aluminum, ferroalloys, calcium carbide, cement, caustic soda, and iron and steel. (Threshold: >20,000 tCO_2/year or energy consumption 10,000 tce/year.)
- ▶ 180 entities (2019) ▶ CNY26.38 ($ 3.82) (average 2020 price)

Fujian — Established September 2016

- ▶ 240 $MtCO_2e$ (2014) ▶ 144 $MtCO_2e$ (60%)
- ▶ Electricity, petrochemical, chemical, building materials, iron and steel, nonferrous metals, paper, aviation, and ceramics. (Threshold: Energy consumption >10,000 tce/year for any year between 2013-2016.)
- ▶ 269 installations (2020)
- ▶ CNY 17.24 ($ 2.50) (average 2020 prices)

Guangdong — Established December 2013

- ▶ 610.5 $MtCO_2e$ (2012) ▶ 427.4 $MtCO_2e$ (70%)
- ▶ Power, iron and steel, cement, papermaking, aviation and petrochemicals. (Threshold: > 20,000 tCO_2/year or energy consumption 10,000 tce/year.)
- ▶ 268 companies (2020)
- ▶ CNY 28.21 ($ 4.09) (average 2020 prices)

Hubei — Established April 2014

- ▶ 463.1 $MtCO_2e$ (2012) ▶ 194.5 $MtCO_2e$ (42%)
- ▶ Power and heat supply, iron and steel, non-ferrous metals, petrochemicals, chemicals, chemical fiber, cement, glass and other building materials, pulp and paper, ceramics, automobile and general equipment manufacturing, food, beverage, medicine producers, and water supply. All power and industrial sectors for entities with annual energy consumption of more than 10,000 tce in any year between 2016 and 2018.
- ▶ 373 companies (2019)
- ▶ CNY 27.21 ($ 3.94) (average 2020 prices)

Shanghai — Established November 2013

- ▶ 297.7 $MtCO_2e$ (2012) ▶ 170 $MtCO_2e$ (57%)
- ▶ Airports, aviation, chemical fiber, chemicals, commercial, power and heat, water suppliers, hotels, financial, iron and steel, petrochemicals, ports, shipping, non-ferrous metals, building materials, paper, railways, rubber, and textiles with various inclusion thresholds.
- ▶ 313 companies (2019)
- ▶ CNY 40.11 ($ 5.81) (average 2020 prices)

Shenzhen — Established June 2013

- ▶ 83.45 $MtCO_2e$ (2010) ▶ 33.38 $MtCO_2e$ (40%)
- ▶ Power, water, gas, manufacturing sectors, buildings, port and subway sectors, public buses, and other non-transport sectors. (Threshold: > 3,000 tCO_2e/year for enterprises; 10,000 m_2 for large public buildings and government buildings.)
- ▶ 706 companies (2020)
- ▶ CNY 23.91 ($ 3.46) (average 2020 prices)

Tianjin — Established December 2013

- ▶ 215 $MtCO_2e$ (2012) ▶ 118.25 $MtCO_2e$ (55%)
- ▶ Heat and electricity production, iron and steel, petrochemicals, chemicals, exploration of oil and gas. Papermaking, aviation, and building materials from 2019. (Threshold: >20,000t CO_2/year considering both direct and indirect emissions)
- ▶ 113 companies (2019)
- ▶ CNY 22.64 ($ 3.28) (average 2020 prices)

Japan — Established 2012

- ▶ 1,200 $MtCO_2e$ (2019)
- ▶ Tax rate corresponding to the amount of CO_2 emissions for all fossil fuels which includes coal, gaseous hydrocarbon, and crude oil/petroleum products.
- ▶ ¥289 (approx. $2.6)

Saitama — Established April 2011

- ▶ 37.2 $MtCO_2e$ (2017) ▶ 7.4 $MtCO_2e$ (20%)
- ▶ Consumption of fuels, heat, and electricity in commercial and industrial buildings (Threshold: facilities with energy consumption > 1,500 kL of crude oil for three consecutive years)
- ▶ 608 facilities

Tokyo — Established April 2010

- ▶ 63.9 $MtCO_2e$ (2018) ▶ 12.8 $MtCO_2e$ (20%)
- ▶ Consumption of fuels, heat, and electricity in commercial and industrial buildings. Threshold: facilities with energy consumption > 1,500 kL of crude oil per year.)
- ▶ 1,200 facilities
- ▶ ¥ 540 ($ 5.06) (estimated standard price 2020)

New Zealand — 2008, further reformed in 2019

- ▶ 78.9 $MtCO_2e$ (2018) ▶ 40.2 $MtCO_2e$ (51%)
- ▶ Forestry (mandatory: deforesting pre-1990 forest land, voluntary: post-1989 forest land), Stationary energy, industrial processing, liquid fossil fuels, Waste, and synthetic GHGs.
- ▶ 2,398 entities
- ▶ NZD 30.83 ($ 19.99) (average 2020 secondary market prices)

Kazakhstan — Launched January 2013 suspended in 2015, relaunched in January 2018

- ▶ 396.6 $MtCO_2e$ (2018) ▶ 162.6 $MtCO_2e$ (41%)
- ▶ Power sector and Centralized Heating. Extractive Industries and manufacturing (including oil and gas mining, metallurgy, and chemical and processing industry (production of building materials: cement, lime, gypsum, and brick) (Threshold: >20,000 tCO_2/year).
- ▶ 130 companies (225 installations) (2018-2020)
- ▶ KZT 456 ($ 1.10) (average 2020 price)

Republic of Korea — Established January 2015

- ▶ 727.7 $MtCO_2e$ (2018) ▶ 538.5 $MtCO_2e$ (74%)
- ▶ The K-ETS covers the following six sectors: heat and power, industry, buildings, transportation, waste sector, and the public sector. The transport sector (freight, rail, passenger, and shipping) and construction industries have been brought into the system's scope, increasing the number of subsectors covered to 69. (Threshold: company >125,000 tCO2/year, facility >25,000 tCO_2/year)
- ▶ 685 entities (2021) ▶ KRW 32,595.83 ($ 27.62) (average secondary market price in 2020)

Singapore — Established 2019

- ▶ 52 $MtCO_2e$ (2018)[d] ▶ 41.6 $MtCO_2e$ (80%)
- ▶ All sectors in the economy are covered. Facilities that report emission at or above 25,000 tCO_2e/year must pay a carbon tax. Companies with facilities that emit direct emissions equal to and above 2,000 tCO_2e per year will also have to register as a reportable facility and submit yearly emission reports.
- ▶ 50 facilities ▶ S$ 5 ($ 3.72)

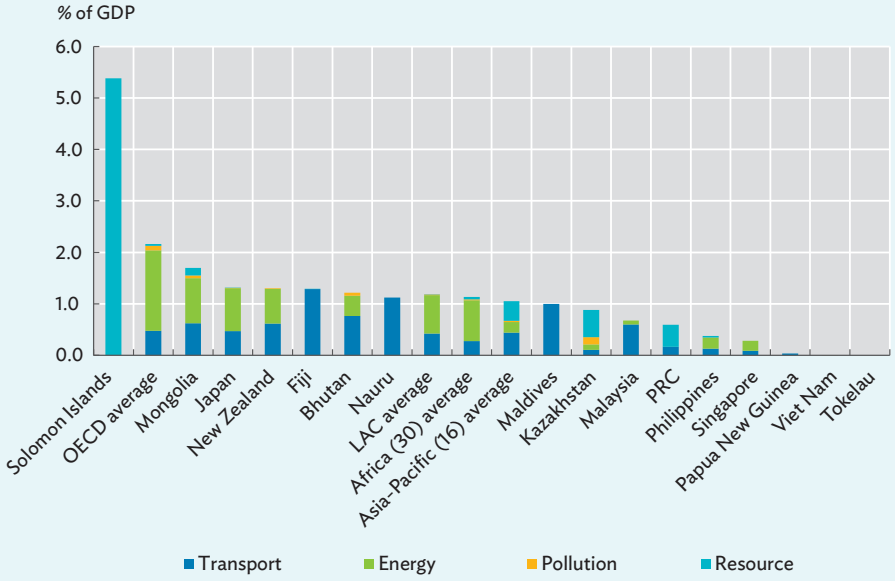
[a] The table has been updated by Rastraraj Bhandari on 27 July 2021 using the International Carbon Action Partnership's updated database as of 23 July 2021. Information on carbon tax regimes has been taken from their respective websites. The prices listed in $ are approximate prices.
[b] Figures are only provided in % coverage. The absolute numbers were calculated by multiplying the per cent term with the Total GHG emissions.
[c] Bloomberg Green. 2021. Top Carbon Market Launch Won't Help China Tame Emissions Yet. 16 July. https://www.bloomberg.com/news/articles/2021-07-16/top-polluter-china-launches-trading-in-biggest-carbon-market
[d] Singapore National Environment Agency. Carbon Tax. https://www.nea.gov.sg/ourservices/climate-change-energy-efficiency/climate-change/carbon-tax

Source: Asian Development Bank.

Box 3 Environmentally-Related Tax Revenue in Asia and the Pacific

An environmentally-related tax is a tax whose base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific harmful impact on the environment regardless of whether the tax is intended to change behaviors or is levied for another purpose. The Organisation for Economic Co-operation and Development (OECD) presents data on environmentally-related tax revenue in Asia and the Pacific for four tax-base categories: energy (including all carbon dioxide-related taxes); transport (mostly motor vehicle taxes); pollution (e.g., discharges of waste or pollutants, taxes on waste or packaging); and resources (e.g., water extraction, hunting and fishing, mining).

In Asia and the Pacific, there is a wide spectrum on the utilization of environmentally-related taxes ranging from countries that do not utilize any environmentally-related tax (such as Viet Nam and Papua New Guinea) to the Solomon Islands where environmentally-related taxes contributed to 5.4% of the gross domestic product (GDP) in 2019. The case of the Solomon Islands is largely due to higher export duties, particularly on timber. Apart from the Solomon Islands, countries with the highest revenue generated from environmentally-related taxes in the region include Mongolia (1.7% of GDP), and Japan, New Zealand, and Fiji (each at 1.3% of GDP). On average, environmentally-related taxes amounted to 1.1% of GDP in the Asia and Pacific region, as shown in the table.



Note: It has not been possible to identify environmentally-related tax revenue for Australia, Indonesia, the Lao People's Democratic Republic, the Republic of Korea, Samoa, Thailand, and Vanuatu due to data availability issues. 2018 data for Africa (30).
Source: OECD from Restricted ERTR database based on PINE database for Japan and New Zealand; OECD. 2021. Revenue Statistics - Asian and Pacific Economies: Comparative tables, OECD Tax Statistics (database) for the remaining countries.

OECD also notes that countries in Asia and the Pacific rely on different environmentally-related tax revenue bases. Taxes on energy and transport are most common in the region and almost all the countries using environmentally-related taxes, except for Maldives and Nauru, use a combination of both energy and transport taxes. Meanwhile, most of the environmental tax revenue in Kazakhstan and Solomon Islands come from resource taxes, through an excise tax on minerals in Kazakhstan and on timber in Solomon Islands. In the People's Republic of China, resource tax comprises of 69.6% of total environmentally-related tax revenue from the country.

Source: OECD. 2021. *Revenue Statistics in Asia and the Pacific 2021: Emerging Challenges for the Asia-Pacific Region in the COVID-19 Era*. Paris: OECD. https://doi.org/10.1787/ed374457-en.

Singapore provides an example in utilizing an economy-wide carbon tax. The design considerations in introducing the carbon tax in Singapore can provide important insights to policy makers in the region considering the introduction of a carbon tax, as highlighted in Box 4.

Another example of carbon tax in the region is the "Tax for Climate Change Mitigation" that Japan introduced in 2012. By using the CO_2e emissions factor of each fossil fuel, the tax rate per unit quantity (kiloliter or ton) is set

Box 4: Carbon Tax in Singapore

The National Climate Change Secretariat (NCCS) is a policy outfit in the Office of the Prime Minister in Singapore that coordinates and formulates the country's climate change policies. At the Singapore International Energy Week 2010, Prime Minister Lee Hsien Loong said that "carbon pricing is an approach that Singapore will consider if there is a global regime to curb emissions." The NCCS led the preparatory work in the lead-up to the implementation of the carbon tax in 2018. As part of the preparatory work, the NCCS conducted studies and visits to various countries and regions that have implemented carbon pricing, such as the European Union, British Columbia and Quebec in Canada, the People's Republic of China, the Republic of Korea, and Japan. The Singapore government also undertook consultancy studies to inform the policy design of the carbon tax. After extensive engagements with stakeholders, listening to concerns of the companies and other government institutions, Singapore announced in 2017 its intent to implement a carbon tax before it was officially implemented in 2019. Its main argument in going for a simple carbon tax over other options was because a carbon tax can achieve the same outcomes as an emissions trading system (ETS), while signaling price certainty and balancing administration burden on companies and implementation costs.

Singapore established the Carbon Pricing Act No. 23 of 2018, which serves as a basis for the implementation of carbon tax. In March 2020, Singapore submitted (i) its updated nationally determined contribution (NDC) to peak its emission at 65 million tons of carbon dioxide equivalent (tCO_2e) by 2030, and (ii) its Long-Term Low-Emission Development Strategy (LEDS) which targets to cut emissions by half to 33 million tCO_2e by 2050, with a view to achieving net-zero emissions in the second half of the century.

Some key features of the carbon tax are as follows:

(i) Facilities that report emission at or above 25,000 tCO_2e/year must pay a carbon tax. It involves about 50 facilities that contribute to about 80% of Singapore's greenhouse gas (GHG) emission.

(ii) Carbon tax is implemented economy-wide, without exemptions.

(iii) It starts with a carbon tax rate of S$5/$tCO_2e$ or about $3,72/$tCO_2e$ from 2019 to 2023 and intends to increase between S$10 to S$15 (or about $7.43 to $11.15) by 2030. Low carbon tax rate at the beginning will help the companies adjust and improve their operational efficiencies, and the rate will be reviewed in 2023.

(iv) Revenue from the carbon tax is recycled back to the economy, by providing support to companies to implement energy efficiency measures.

(v) Additional rebates set at S$20, or about $15, per eligible household per year have been planned for the first 3 years to help households adjust to the carbon tax.

Companies with facilities that emit direct emissions equal to and above 2,000 tCO_2e/year will also have to register as a reportable facility and submit yearly emission reports. The emissions to be considered will be for fuel combustion and industrial process and product use. Facilities with emissions higher than 25,000 tCO_2e/year must be registered as taxable facility and submit monitoring plan and emission reports annually. To assist the companies with estimating their emissions, the National Energy Agency provides tools and templates for emission calculations.

Source: Singapore National Environment Agency. Carbon Tax. https://www.nea.gov.sg/ourservices/climate-change-energy-efficiency/climate-change/carbon-tax (accessed 2 February 2021).

at equal to ¥289/tCO2e. To avoid a rapid increase in burden, tax rates were raised in three stages over the first 3.5 years.[39]

There are several carbon tax initiatives under consideration in the region. The Ministry of Finance in Indonesia is considering the introduction of a carbon tax which may be accompanied by complementary policies to address unintended impacts. Discussions on a carbon tax took place already a decade ago. In 2009, the Indonesian government considered introducing a carbon price following the publication of a paper on climate change identifying policy options that would help the country reach its international climate change commitments. The paper proposed applying a carbon tax on fossil fuel combustion for electricity generation and large industrial installations as of 2014, at $10/tCO2e, but no legislation was introduced then to impose the tax.[40] Under Indonesia's New Tax Bill (Article 44G), carbon emissions that have a negative impact on the environment will be subject to a minimum carbon tax of IDR75 per kilogram of CO2e or other equivalent measurement unit (equivalent to around $5.2/tCO2e).[41]

In the Philippines, several carbon-pricing instruments have been discussed in Congress at various points, including a carbon tax and an ETS. However, there are concerns about further increases in energy costs and the Department of Energy has stated repeatedly that a carbon tax in the power sector would make the sector uncompetitive and prohibit sector growth.[42] Based on a technical report, the Department of Finance supports the establishment of an intensity-based ETS primarily focused on the power sector, that can be expanded to other emitters like large industrial facilities.[43]

On the other hand, emissions trading is a more widely used form of carbon pricing in Asia and the Pacific. An ETS is attractive because, among others, it encourages GHG emission reductions to occur where it is the cheapest and provides flexibility in how companies can comply (footnote 14). The Republic of Korea became the first country in East Asia to implement a nationwide mandatory emissions-trading scheme on 1 January 2015. The experience of the Republic of Korea has demonstrated that a gradual introduction of the scheme can minimize implementation challenges, that close communication with industry is crucial, and that a clear and consistent price signal to the market is necessary. The COVID-19 pandemic also significantly disrupted operations across several sectors, which may have an unexpected impact on the allocation of permits and functioning of the scheme. However, as the recovery proceeds and the Korean Green New Deal is implemented, the Korean ETS could potentially become even more relevant to other countries in Asia as they also strive to achieve net-zero emissions goals.[44]

In addition, Kazakhstan, New Zealand, and the PRC have implemented a national ETS. Local jurisdictions in Japan also use an ETS. In March 2021, Indonesia announced the launch of a voluntary ETS trial for the power sector, running from March to August 2021, covering 80 coal-fired power plants.[45] According to the International Carbon Action Partnership, Pakistan; the Philippines; Taipei,China; and Thailand are also currently considering adopting domestic ETS.[46] In Viet Nam, the National Assembly has recently adopted legislation to prepare for

[39] Government of Japan, Ministry of the Environment. 2017. *Greening of Whole Tax System and Carbon Tax in Japan*. http://www.env.go.jp/en/policy/tax/20170130_greening.pdf.

[40] OECD. 2019. OECD Environmental Performance Reviews, OECD Green Growth Policy Review of Indonesia.

[41] F. Rodyanto and A. S. Suwana. 2021. Putting A Price On Emissions: Indonesian Government Plans To Impose Carbon Tax. *Mondaq*. 28 July. https://www.mondaq.com/renewables/1096108/putting-a-price-on-emissions-indonesian-government-plans-to-impose-carbon-tax.

[42] K. Crismundo. 2021. Carbon tax makes PH energy sector uncompetitive: DOE chief. *Philippine News Agency*. 9 March. https://www.pna.gov.ph/articles/1133078.

[43] P.A. Alvarez. 2021. PMR East Asia and Pacific Regional Webinar on Carbon Pricing - from Readiness to Implementation Philippines. 19 May.

[44] Government of the Republic of Korea, Ministry of Economy and Finance. 2020. Government Releases an English Booklet on the Korean New Deal. 28 July. https://english.moef.go.kr/pc/selectTbPressCenterDtl.do?boardCd=N0001&seq=4948

[45] International Carbon Action Partnership (ICAP). 2021. Indonesia launches voluntary ETS trial for power sector. 20 March. https://icapcarbonaction.com/en/news-archive/764-indonesia-launches-voluntary-ets-trial-for-power sector#:~:text=ETS%20Library,Indonesia%20launches%20voluntary%20ETS%20trial%20for%20power%20sector,from%20March%20to%20August%202021.

[46] ICAP. 2020. *Emissions Trading Worldwide: Status Report 2020*. https://icapcarbonaction.com/en/icap-status-report-2020.

the implementation of a domestic ETS.[47] The law establishes a mandate for the Ministry of Natural Resources and Environment (MONRE) and the Ministry of Finance (MOF) to design a domestic emissions trading scheme and a crediting mechanism. The framework legislation gives MONRE a legal mandate to establish an emissions trading scheme, i.e., set a cap, and determine the method of allowance allocation, which allows for the inclusion of domestic and international offsets. The Law on Environmental Protection will enter into force on 1 January 2022. MOF and MONRE are considering a timeline for ETS implementation; a pilot system is expected to start by 2025 and to become fully operational by 2027.

Brunei Darussalam launched the Brunei Darussalam National Climate Change Policy in 2020 and has identified carbon pricing as one of the country's key strategies for driving the transition toward achieving a low-carbon economy and becoming climate-resilient. The carbon-pricing instrument is planned to be applicable to all industrial facilities emitting beyond a carbon emissions limit threshold and the plan is to launch the carbon-pricing instrument by 2025.

There are important lessons to be learned from the adoption of both carbon taxes and domestic ETS in Asia and the Pacific. The PRC provides an interesting example of piloting an ETS at the regional level, in order to understand opportunities and challenges, before launching a full national ETS. Box 5 provides details on the ETS implemented in the PRC.

Despite growing momentum in Asia and Pacific, the region can do more, in terms of geographic coverage and higher prices. The IMF has analyzed how fiscal policy can address climate change challenges in Asia and the Pacific.[48] The study notes that carbon taxes are used minimally in the region, but that it can be a highly effective mitigation tool especially when supported by complementary measures.

The study further shows that the region would greatly contribute to global mitigation efforts through gradual and steady implementation of carbon taxes. To illustrate, a carbon tax of $25 per ton—relatively modest compared to the $50–$100 models suggested to keep global warming below 2°C —implemented collectively and gradually in the region over the next 10 years, would reduce regional emissions by 21% by 2030, overperforming the region's Paris Agreement targets on an aggregate basis (8%). At this tax rate, carbon taxes could produce additional revenue of about 0.8% of GDP, a significant but feasible fiscal effort over 10 years. However, limiting global warming by 2°C or less would likely require a carbon tax rate significantly higher than $25 per ton. The Intergovernmental Panel on Climate Change has estimated that to reach peak temperatures below 1.5°C in the 21st century with 50%–66% probability, price ranges have to be between $135–$6,050/tCO_2e in 2030 and even more later on.[49]Although it is too soon to reach such price levels in a region that is only considering carbon-pricing instruments now, the key is to start to price carbon, sending the signal that emitting GHG will come with a cost.

[47] ICAP. 2020. New law in Vietnam creates mandate for ETS. 17 November. https://icapcarbonaction.com/en/news-archive/730-new-law-in-vietnam-creates-mandate-for-ets.

[48] E. Dabla-Norris et al. 2017. Fiscal Policies to Address Climate Change in Asia and the Pacific. *IMF Departmental Paper Series*. No. 21/07. Washington, DC: International Monetary Fund.

[49] H. de Coninck et al. Forthcoming. Strengthening and Implementing the Global Response. In V. MassonDelmotte, et al, eds. *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*.

Box 5: Emissions Trading Scheme in the People's Republic of China

The People's Republic of China (PRC) initiated its emissions trading scheme (ETS) through local pilots in the country. Building on the successful implementation of eight local pilots, the PRC launched its national ETS politically in December 2017. Upon the political launch, a development road map was outlined in a work plan which was then approved by the State Council of the PRC, the highest administrative body. Since 2018, the responsible institution for the ETS in PRC was also transferred from the National Development and Reform Commission (NDRC) to the newly established Ministry of Ecology and Environment (MEE).

In February 2021, the PRC began the operational phase of its national ETS after successfully piloting carbon markets in eight regions with the country. This followed the MEE publishing key ETS policy documents in January 2021, along with an announcement that regulated entities will need to surrender allowances from the 2019–2020 emissions in 2021. Although the system in the PRC is largely referred to as an ETS, it is more precisely, a set of sector tradable performance standards (TPS). It is a rate-based system, implying that reduced electricity generation efficiency will affect compliance in a somewhat different manner than in a straightforward ETS.

The ETS is estimated to cover approximately 40% of national carbon emissions and currently regulates over 2,200 companies from the power sector (including combined heat and power, as well as captive power plants of other sectors), which emit more than 26,000 tons of carbon dioxide equivalent (tCO_2e) per year. The ETS is estimated to cover more than 4 billion tCO_2e, accounting for approximately 40% of national carbon emissions, with the scope to be further expanded in the future. In July 2021, 4.1 million tons of carbon dioxide quotas worth CNY210 million ($32 million) were traded in the first day with an opening price of CNY48 per ton ($7.42), and the price closing 6.7% higher at CNY51.23 ($7.92).[a]

In the short term, the pilots are expected to continue to operate in parallel with the national market, covering sectors not included in the national market, while aiming to gradually transition into the national ETS. In the long run, the ETS will play an important role in power sector decarbonization and enable the PRC to achieve its carbon neutrality goals by 2060.

[a] *Bloomberg Green*. 2021. Top Carbon Market Launch Won't Help China Tame Emissions Yet. 16 July. https://www.bloomberg.com/news/articles/2021-07-16/top-polluter-china-launches-trading-in-biggest-carbon-market.

Source: International Carbon Action Partnership. 2021. China National ETS. https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=55.

7 Designing Carbon Pricing to Support a Green Recovery

Carbon pricing is gaining recognition globally in supporting a green, inclusive, and resilient recovery. The delivery of the necessary quality and scale of investments for a green recovery requires structural policies such as carbon pricing that set expectations and a clear sense of direction with much faster progress.[50] To do so, carbon pricing needs to be complemented by a broader range of policies and regulatory measures at the economy-wide and sector levels to provide clarity and confidence on future expectations (footnote 50). Carbon pricing should also go together with policies on innovation and specific technology support.[51] Further, if carbon emissions continue to be underpriced, pursuing decarbonization with green stimulus measures will be much less effective (footnote 51). Therefore, having a price on carbon reinforces green stimulus and, in addition, can align traditional forms of stimulus with decarbonization's objectives (footnote 51).

To help ensure that carbon-pricing initiatives support green recovery, it is important that carbon pricing is developed and implemented

1. **Urgently**. Policies should be designed to mobilize resources in time to support the post-COVID-19 economic recovery. This needs to consider the time it takes to collect and re-deploy revenues generated through carbon pricing and the establishment of financing arrangements.
2. **Smoothly**. Carbon-pricing schemes should be simple to implement and administer. Carbon-pricing instruments, especially ETS, are complex and usually require extensive monitoring, reporting, and verification systems, as well as access to trading platforms and legislative frameworks for trading allowances. The institutional capacity needed to operate such schemes can take years to develop. Therefore, for carbon-pricing policies to support economic recovery may require using or building upon existing national policy instruments, such as product taxation, and their systems for collecting and reporting data, as well using existing trading platforms and registries for environmental commodities.
3. **Sensibly.** Design features can determine whether pricing instruments stimulate or constrain economic activity and growth. Stimulating economies is a primary aim of recovery strategies. Carbon pricing can help to make those strategies green. Designing carbon-pricing instruments must also take into account distributive effects and transition costs.

Despite the strong policy case for using carbon pricing, policy makers may be concerned about potential adverse impacts on economic performance, especially during a recovery. There are indeed economic costs associated with any regulation, but several factors can more than ameliorate the costs associated with carbon-pricing policies.

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50 N. Stern. 2021. *G7 leadership for sustainable, resilient and inclusive economic recovery and growth: An independent report requested by the United Kingdom Prime Minister for the G7*. London: London School of Economics and Political Science.

51 OECD. 2020. *Green budgeting and tax policy tools to support a green recovery*. https://read.oecd-ilibrary.org/view/?ref=137_137215-2knww1hckd&title=Green-budgeting-and-tax-policy-tools-to-support-a-green-recovery&_ga=2.43132069.1805502108.1620909552-591323893.1590292922.

A primary synergy between carbon pricing and recovery strategies is the opportunity to increase fiscal stimulus resources, while shifting economic activity away from environmentally and socially harmful (non-green) investments, expenditures, and consumption. In the context of supporting a green economic recovery, however, carbon-pricing instruments need to be designed carefully such that countries can harness this synergy. While carbon-pricing instruments can be used to mobilize revenues, collecting new revenues while trying to stimulate the economy can be counterproductive and impede growth.

Some economists have argued that mobilizing additional revenues from fossil fuels would be beneficial in terms of economic efficiency if those revenues are used to lower other taxes that are more distortionary, thereby potentially supporting growth. While this might be a relevant consideration in the context of general taxation policy reform under normal economic conditions, it is less likely to be relevant in the context of mobilizing additional resources for stimulus support (unless the stimulus itself was designed in the form of temporary tax relief). It is more likely that by tapping into the revenue-generating potential of carbon pricing, governments will have the opportunity to ease the pressure to increase other, potentially more distortive, taxes. In situations where multiple taxes are imposed on the same product, it may also be appropriate to restructure existing taxes under a single carbon tax, to create efficiency gains.[52]

Notably, to ensure that carbon pricing does not impede economic recovery, an effective approach would be to initially implement a tax with a low rate or an ETS with a high (only slightly binding) cap. Such policies will incentivize the development of much needed policy infrastructure, such as monitoring, reporting, and verification (and registries and trading platforms for ETS) for carbon-pricing instruments, without imposing undue drag on the economy. Policies can then be made more stringent over time, to realize both environmental and fiscal benefits. Note that an ETS is inherently countercyclical, in that the demand and price of allowances will go down in a recession, just when regulated firms need relief,[53] which is also one advantage of an ETS over a carbon tax. Doing so can help ensure that carbon pricing only gradually increases relative prices of fossil fuels (input costs to businesses and consumers) and does not create a drag on economic growth. The impact can be further ameliorated by distributing some of the revenue from carbon pricing to stakeholders.[54] Carbon price can start low, but it should have a long-term price signal to market that the price will go up in order to provide incentive for behavioral changes (Figure 5).

The need to design carbon-pricing instruments could not be timelier as advanced economies globally are seeking to raise ambition within their carbon-pricing jurisdictions, particularly in the form of addressing carbon leakage. In fact, risks of carbon leakage can be addressed through policy design choices. While the State of California is already using a form of Carbon Border Adjustment Mechanism (CBAM), where an adjustment is applied to certain imports of electricity, Canada, Japan, and the United States are also considering similar initiatives. The EU, which is a forerunner in using carbon- pricing instruments to achieve emission reductions, has recently proposed a CBAM to prevent carbon leakage externally, which will provide an incentive for producers in non-EU countries to green their production processes.[55] Therefore, in designing carbon-pricing instruments to support a green recovery, countries must also consider the overall momentum and direction on carbon pricing globally, and what that means to countries given their national circumstances and trade portfolio with other countries, especially on sectors that are to be covered under potential border adjustment mechanisms. Box 6 provides more information on the EU's CBAM.

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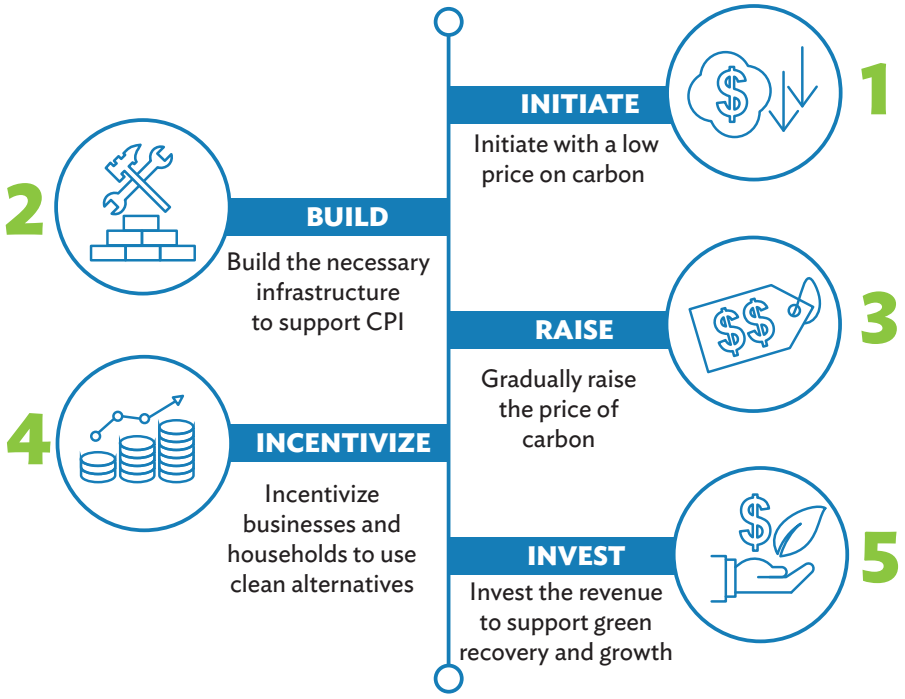
52 A. Yokoyama, K. Ueta and K. Fujikawa. 2000. Green tax reform: converting implicit carbon taxes to a pure carbon tax. *Environmental Economics and Policy Studies*. 3(1). pp. 1–20.

53 It is very important to clearly differentiate this sort of inherent countercyclical nature in an ETS from how revenues are used. For one thing, the central purpose of a carbon-pricing system is to increase the marginal cost of fossil fuels, relative to non-fossil fuels. In a well-designed system, how the revenues are used should not affect (or be affected by) the performance of the system. (The same is true for the method of allocation, in a well-designed system.)

54 Though it is important that dividends or the like not be proportional in any manner to energy use or carbon emissions, which would undercut incentives to reduce use of fossil fuels.

55 European Commission. 2021. Carbon Border Adjustment Mechanism: Questions and Answers. https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661

Figure 5: Carbon Pricing Support in Green Recovery and Growth



CPI = carbon-pricing instrument.
Source: Asian Development Bank.

Box 6: The European Union's Carbon Border Adjustment Mechanism

The European Union (EU) has adopted the European Green Deal which sets out a clear path toward realizing the EU's ambitious target of a 55% reduction in carbon emissions (compared to 1990 levels) by 2030, and to become a climate-neutral continent by 2050. To achieve this target, the EU Commission has proposed a Carbon Border Adjustment Mechanism (CBAM) to prevent the risk of carbon leakage. The CBAM will require European importers to treat the imported goods as if they were produced in the EU and buy carbon certificates corresponding under EU's carbon-pricing rules. If the non-EU producer has already paid a price for the carbon used in the production of the imported goods in another jurisdiction, the corresponding cost can be fully deducted for the EU importer. In doing so, the CBAM will help reduce carbon leakage and incentivize producers from non-EU countries to "green" their operations, setting a good stage for countries adversely impacted by the CBAM to set up a competitive price on carbon themselves.

According to the proposal, the CBAM is being phased in gradually to provided businesses and other countries with legal certainty and stability. In addition, the CBAM will initially apply only to a select few goods where there is a high risk of carbon leakage, which include iron and steel, cement, fertilizer, aluminum, and electricity generation. Subsequently, a reporting system will apply from 2023 for the abovementioned products, with the overall objective to facilitate a smooth rollout as well as dialogue with the affected countries. It is expected that importers will start paying a financial adjustment in 2026. Lastly, despite some calls for the revenues from the CBAM to go toward affected countries to adjust to this transition, revenues are proposed to contribute to the EU's budget, as laid out in the December 2020 Interinstitutional Agreement on budget and own resources.

Source: European Commission. 2021. Carbon Border Adjustment Mechanism: Questions and Answers. https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661.

In the context of supporting a green recovery, countries could also explore leveraging established avenues to scale up cooperation and mobilize upfront finance to boost economic recovery packages. An example of a carbon-pricing policy that fits such criteria would be the introduction of a tax that uses existing tax instruments to incorporate the carbon content of a product into the tax rate. This could be an indirect way of pricing carbon emissions. The tax could be enacted but with delays in implementation for revenue collection until after the economic recovery takes hold, in order to avoid creating drag for the economic recovery. The future revenues from the tax can be used to mobilize upfront finance, which could support the recovery. One option is for the revenue stream to create fiscal space for the government (Box 7).

Box 7: Creating Fiscal Space Through a Carbon Tax on Energy Products in Ireland

Starting from late 2008, Ireland was facing a fiscal crisis. It needed external financial backing to support its fiscal position. In 2010, the Irish government secured substantial financial support from the European Central Bank, the European Commission, and the International Monetary Fund (collectively referred to as "the Troika"), on the condition that it would meet a number of targets focused on raising revenue and cutting expenditures. A carbon tax on energy products used in transportation, to heat buildings, and in some industrial processes helped Ireland meet the higher revenue generation targets. The tax was calibrated based on expected carbon dioxide emissions at a rate of €15 per ton of carbon dioxide equivalent (tCO_2e). Since its introduction, the tax has periodically increased and has broadened in coverage. In the 2021 budget, it was announced that the carbon tax on fossil fuels will increase by €7.50, from €26 to €33.50 per tCO_2e.[a]

The carbon tax was an important source of new tax revenue. A review of tax receipts in the initial period since introduction shows that in aggregate, the carbon tax made a relatively small contribution to revenue generation. In 2012, it contributed below 1% of the total tax revenue. However, the role of the carbon tax was much more significant at the margin. From 2010 to 2012, the carbon tax contributed between 21.5% to 24.6% of the *additional* tax revenue required by the Troika. The carbon tax helped constrain the need to increase other more distortionary taxes, such as income taxes.

A series of measures targeting energy efficiency (particularly in poorer households) were introduced in the leadup to and following the introduction of the tax. As tax revenue increased, due to broadening of tax coverage and higher rates of taxation, the government used revenues to support specific priorities. Supported programs included energy efficiency investments and fuel allowance transfers to protect those vulnerable to higher energy costs, resources for a just transition, and investments in low-carbon transition both domestically and internationally.

[a] Government of Ireland, Department of Public Expenditure and Reform. 2020. Budget 2021 Tax Policy Changes. http://budget.gov.ie/Budgets/2021/Documents/Budget/BUDGET%2021_Tax%20Policy%20Changes.pdf.

Source: F. Convery, L. Dunne, and D. Joyce. 2013. Ireland's Carbon tax and the Fiscal Crisis. OECD Environment Working Papers. No. 59. Paris: Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/environment-and-sustainable-development/ireland-s-carbon-tax-and-the-fiscal-crisis_5k3z11j3w0bw-en;jsessionid=FLOFaph1UKBopdENFTL-SGIt.ip-10-240-5-173.

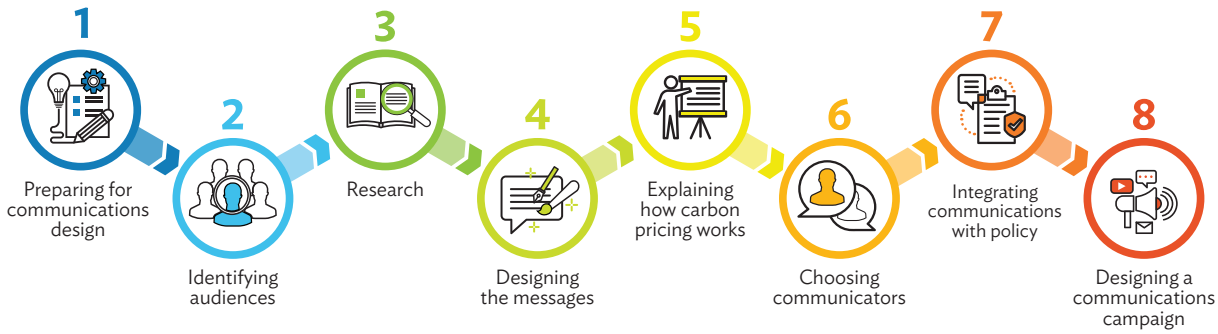
Although revenue generation that creates fiscal space is a key benefit of carbon-pricing instruments, in the context of supporting a green economic recovery, emphasis needs to be put on earmarking the revenue for climate action or green developments and away from general spending.

Finally, a key to successful implementation is to communicate the initiative effectively. First, the fundamental requirement is to have an effective and robust policy (or plan). No communication campaign can rescue a policy if it is poorly designed. Second, making the use of revenues visible is important and may even be the most important aspect in some jurisdictions where expectations are high on revenues going to an agenda that is urgent in the specific country (see Section 5). Third, emphasizing non-climate benefits is important since climate change in some countries will be a less-tangible issue compared to others. This relates to the importance of communicating the benefits to different stakeholders. Certainly, not all audiences see economic efficiency as

their major interest in climate policy.[56] To summarize, developing a communication plan should be one of the key elements in design considerations and in the early planning stages. A communications plan can be arranged in eight steps (footnote 56).

As shown in Figure 6, the communication plan ranges from preparing communication designs, identifying the audiences, to choosing communicators and designing a communications campaign. Such communication plans are usually designed to create or maintain support for carbon pricing, but objectives could be more specific, such as making the carbon price signal visible to ensure an informed debate on carbon pricing or carbon policy options or obtaining feedback from stakeholder groups (footnote 56).

Figure 6: Developing a Carbon Pricing Communications Campaign



Source: Partnership for Market Readiness. 2018.

A primary step for the lead government agency in introducing carbon-pricing instruments is to create support within the government as different ministries may have different positions with respect to supporting climate policy. As a result, targeted strategies that are framed differently to suit different ministries and their preferences and mandates should be designed. For example, the finance department may favor revenue opportunities, the foreign affairs department may be interested in building an international profile, and the environment department may prioritize benefits to environmental protection (footnote 56).

If a consensus is not first built within the government, communication and dialogues with stakeholders in priority target groups and the general public can become challenging (footnote 56). In fact, the government may not be able to build a consensus among all stakeholders including within its own government. However, keeping all stakeholders as part of the design process and providing support to help them adjust and transition due to the introduction of carbon pricing will be critical in ensuring support for carbon pricing in the long run. Another important aspect of developing a communications plan and designing messages to build stakeholder consensus is how to explain carbon pricing. There are parts of the targeted population that can grasp the full complexities of carbon pricing, but there are also others for which the messages need to be simpler, creating a need for informative and accessible language (footnote 56).

[56] Partnership for Market Readiness and Carbon Pricing Leadership Coalition. 2018. Guide to Communicating Carbon Pricing. Washington, DC: World Bank.

Transparency is another critical element in building confidence. Companies (compliance entities), other market participants, the public, media, and nongovernment organizations should be informed about how the carbon-pricing instrument is working. Ultimately, to develop a socially accepted instrument, information about emissions data, progress and contribution toward climate policy objectives, auction, market transactions (for ETS), and revenue use should be easily accessible.

Experience from the development of the Korea ETS shows that close and continuous communication with the industry is crucial. Industry buy-in is vital to the successful introduction and operation of the scheme.[57] In addition, there is a need for extensive consultations targeting a broad range of stakeholders ranging from the private sector, civil society, and labor unions. Doing so not only helps understand the acceptability of the potential introduction of carbon-pricing instruments, but also identifies how stakeholder consensus can be built if there are potential disagreements (footnote 56). These exercises can help governments understand the communication strategy that needs to be tailored to different players of the economy.

Communicating carbon pricing is key to its implementation, and perhaps even more during a green recovery. Framing the introduction of carbon pricing heavily relying on concepts such as "price on carbon" and "internalizing the social costs of fossil fuels" may send wrong signals to most audiences under a green recovery phase (footnote 56). Highlighting the positive elements and benefits; gradual and phased approach to carbon pricing; and support from the government to safeguard the needs of those most impacted, including how revenue is used, would be a better strategy to communicate carbon pricing when implemented to support green recovery and growth.

[57] ADB. 2018. *The Korea Emissions Trading Scheme: Challenges and Emerging Opportunities.* https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf.

8 Carbon Pricing, Green Growth, and the Path toward Net Zero

Aside from supporting a green recovery, well-designed carbon pricing instruments can generally support green growth and the transition to a low-carbon economy and in the longer term achieve a net-zero target. To illustrate, there is now evidence on how the ETS in the PRC will play an important role in the country's power sector decarbonization and help achieve carbon neutrality goals by 2060.[58] This is building on the increasing evidence on the benefits provided by carbon pricing in reducing emissions cost effectively in the long term (footnote 20). Furthermore, according to the IMF, implementation of carbon taxes along with green investment stimulus could increase the level of global GDP by about 0.7% in the next 15 years and create around 12 million new jobs through 2027.[59] In this context of increasing momentum toward a net-zero target globally as well as in Asia and the Pacific, this section highlights some of the issues that may come into consideration when countries design fiscal stimulus strategies and identifies implications that these issues may have with respect to supporting green growth in the longer term.

In designing a stimulus strategy, governments face several choices on how to deploy the stimulus, including what segment of economic activity to target (consumers, businesses, and government spending); whether to use economy-wide or more directed interventions; and whether to focus on short-term multipliers or long-term policy objectives. The approach will depend on specific national circumstances, preferences, and priorities.

The delivery mechanism of the stimulus is another consideration. Fiscal stimulus is usually delivered either in the form of tax cuts, transfer payments, or direct government spending. While tax cuts and transfer payments can be rapidly disbursed, these measures might not be conducive for reaching lower-income groups, particularly in developing countries. Direct government spending can boost activity, but if spending is targeted at sectors that rely heavily on imports, there is risk that multipliers will be low (or even negative).[60] A higher multiplier implies that more activity is stimulated in the economy. Investments in renewables and energy efficiency programs have been shown, by at least one study, to have significantly larger multipliers compared to conventional energy investments: "Every $1 million in spending generates 7.49 full-time jobs in renewables infrastructure, 7.72 in energy efficiency, but only 2.65 in fossil fuels."[61] However, to achieve high multipliers, it might be necessary to first nurture the development of domestic industries that can benefit from these kinds of investments.

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58 IEA. 2021. The Role of China's ETS in Power Sector Decarbonization. International Energy Agency. https://www.iea.org/reports/the-role-of-chinas-ets-in-power-sector-decarbonisation

59 K. Georgieva. 2021. *Securing a Green Recovery: The Economic Benefits from Tackling Climate Change.* Speech given during the People's Bank of China–International Monetary Fund High-Level Seminar on Green Finance and Climate Policy. Washington, DC. 16 April. https://www.imf.org/en/News/Articles/2021/04/15/sp041521-securing-a-green-recovery#_edn1.

60 I. Steel and T. Harris. 2020. *COVID-19 economic recovery: fiscal stimulus choices for lower-income countries.* London: Overseas Development Institute. https://www.odi.org/publications/17378-supporting-economic-recovery-covid-19-fiscal-stimulus-challenges-and-options-lower-income-countries.

61 H.G. Paltier. 2017. Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. https://ideas.repec.org/a/eee/ecmode/v61y2017icp439-447.html.

Box 8: Achieving Net-Zero Carbon Emissions

In the Paris Agreement, countries agree to "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases (GHGs) in the second half of the century."[a] This is emphasized in the Intergovernmental Panel on Climate Change (IPCC) special report: "From a mitigation perspective, 1.5°C-consistent pathways require immediate action on a greater and global scale so as to achieve net zero emissions by midcentury, or earlier." It is first after reaching and sustaining net-zero GHG emissions, defined by the 100-year global warming potential, it will be possible to see a decline in surface temperature.[b]

There are different ways to define net zero. The Paris Agreement refers to the notion of global net- zero carbon dioxide (CO_2) emissions, which, according to IPCC, is "a requirement for stabilizing CO_2-induced global surface temperature increase, with anthropogenic CO_2e emissions balanced by anthropogenic removals of carbon dioxide (footnote b)."

This is different from achieving net-zero GHG emissions, where metric-weighted anthropogenic GHG emissions equal metric-weighted anthropogenic removals. The second definition is typically used by governments and the private sector and can be defined as "achievement of a state in which an entity removes from the atmosphere as much GHGs as it causes."[c] Subnational and corporate actors typically plan to use natural sinks, such as reforesting land or adopting agricultural best practices, or technical solutions such as carbon capture and storage.

Carbon neutrality technically means net-zero emissions of only CO_2, while climate neutrality includes all GHGs. Definitions of net zero, zero emissions, carbon and climate neutrality are often used interchangeably and there is no globally agreed definition. Typically, net-zero targets do not include the use of compensation or offsets, which carbon and climate neutrality can do. The target year for reaching net zero as well as the metrics and gases included to determine how net zero can be reached varies, and the pathways for reaching net zero may differ.

What is the relation between a carbon-pricing instrument and a net-zero target? First, starting with emissions trading systems (ETS), a net-zero target is a cap which means that there needs to be a gradual reduction of the cap of the ETS to zero. Such a zero-emissions cap could include the use of domestic or international offsets. The issue for carbon pricing is the level of price that will be required—if a carbon tax is to result in net zero, or what the price will be for regulated entities when approaching net zero. Identifying the highest marginal abatement costs in regulated sectors is one way of estimating what the maximum level of allowance prices could be.

One study looks at the United Kingdom and suggests that marginal abatement costs for the electricity sector reaches approximately $145 and for energy-intensive industrial sectors up to $195.[d] The same study highlights that the marginal abatement cost in the European Union could reach €350 for reaching net zero by 2050. The study concludes that compared to current carbon prices in existing ETS, the prices would need to increase 10 times or more in the next 30 years to reach net-zero emissions.

[a] United Nations Framework Convention on Climate Change. 2015. The Paris Agreement.

[b] IPCC. 2021. The Sixth Assessment Report. https://www.ipcc.ch/assessment-report/ar6/

[c] New Climate Institute and Data-Driven Enviro-Lab. 2020. Navigating the Nuances of Net Zero Targets. https://newclimate.org/wp-content/uploads/2020/10/NewClimate_NetZeroReport_October2020.pdf

[d] S. F. Verde et al. 2020. Achieving Zero Emissions Under a Cap-And-Trade System. *Florence School of Regulation Climate Policy Brief.* No. 26. Florence: Robert Schuman Centre for Advanced Studies– European University Institute.

Source: Asian Development Bank.

To support climate mitigation (emissions reduction) actions in support of green growth under "normal" economic conditions, mobilized revenues could be used based on a framework that targets one or several of these areas:

1. **Revenues could address political economy considerations**. To ensure that carbon-pricing policies are politically sustainable over the long term, within-society transfers may be required. For example, these transfers could take the form of reskilling workers from adversely impacted industries to facilitate their transition to obtain green jobs. A specific agenda—just transition— is emerging in this area to mitigate the impact of climate policies.
2. **Cost-effective abatement opportunities that are not realized due to non-price barriers should be targeted**. Revenue can be used to remove the non-price barriers. Examples include retrofitting government-owned buildings and supporting public education programs that target cost-negative abatement opportunities, such as waste recycling and ecological driving.
3. **Mechanisms can also be developed that make extremely costly measures more affordable**. For example, this may entail channeling some of the mobilized revenues toward research, development, and demonstration initiatives (e.g., the Innovation Fund of the EU ETS).

The three abovementioned areas—transformation of industrial sectors, education and behavioral change, and support to research and development—are all examples where revenues from carbon pricing can support the transition to a low-carbon economy, or for achieving a net-zero target. Building on this framework, the key idea is to reap the benefits well-designed carbon-pricing instruments can provide in supporting green growth and achieving a net-zero target cost effectively, while earmarking the revenue for climate action or green developments and away from general spending, such as general tax cuts. A recent study highlights the carbon-pricing potential in East and South Asia and identifies the relevant conditions for the implementation of carbon-pricing policies along political, legal, economic, technical, and regional dimensions, which in turn are the core components to assess carbon-pricing readiness.[62] Carbon pricing thus remains a central element in accelerating the transition to a new climate economy and strengthening green growth.

[62] B. Doda, A. Boute, and J. Ewing. 2021. *Carbon Pricing Potential in East and South Asia. German Environment Agency. Interim Report.* https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-05-19_cc_40-2021_carbon_pricing_asia.pdf.

9 Conclusion

Carbon pricing is an integral element of the broader climate and energy policy architecture. When designed and implemented appropriately, carbon-pricing instruments, such as carbon taxes and ETS, provide multiple benefits, most notably revenue generation in the context of supporting green recovery and growth and the transition to a low-carbon economy, and in the longer term achieving a net-zero target. Clear and predictable carbon-price signals in domestic and international markets can also enhance the economic competitiveness of low-carbon technologies and help countries achieve the climate targets articulated in their respective nationally determined contributions (NDCs) cost-effectively.

In the context of supporting a green recovery, carbon-pricing schemes can help safeguard and even create fiscal space by mobilizing revenue that provides much-needed countercyclical support for economic recovery from the COVID-19 pandemic. However, doing so at the time of economic recession requires careful design considerations to ensure that pricing instruments stimulate and not constrain economic activity and growth. Policies should be designed to mobilize resources in time to support the post-COVID-19 economic recovery.

Carbon-pricing instruments should be simple to implement and administer, but, especially in the case of ETS, are complex and usually require extensive monitoring, reporting, and verification systems, as well as access to trading platforms and legislative frameworks for trading allowances. Carbon-pricing policies for supporting economic recovery may require using or building upon existing national policy instruments, such as product taxation, and their systems for collecting and reporting data, as well using existing trading platforms and registries for environmental commodities. Carbon pricing is a universal policy instrument, but its implementation needs adaptation to national circumstances and fit within the political economy of the country.

It is equally important to earmark revenues from carbon-pricing instruments toward climate action or green investments, such that the recovery is green. If designed correctly, carbon-pricing instruments can be sustained to last well beyond supporting green recovery and to also ensure green growth in the longer term. Designing carbon-pricing instruments must also consider distributive effects and transition costs. How revenues are used will be an issue that is specific to each country and their specific circumstances. Communicating the benefits, including non-climate specific benefits, and how revenues are used, is important for creating understanding of the carbon-pricing instrument.

A comprehensive carbon-pricing strategy would look at both the domestic opportunities and the options for linkages with other countries and how to take advantage of international carbon finance. There are emerging opportunities in Asia and the Pacific for mobilizing finance by scaling up international cooperation under Article 6 of the Paris Agreement. There has been a growing momentum on the use of carbon-pricing instruments not just globally, but also in the Asia and Pacific region.

Policy makers should harness the benefits that carbon pricing can contribute to green recovery and growth. It is crucial to initiate the preparatory work for carbon pricing and to implement an instrument in such a way that it initially generates a low carbon price, to avoid impeding economic growth, but to raise price over time. Urgent action on the part of policy makers is needed: evaluating options, consulting with stakeholders, and adopting and implementing appropriate carbon-pricing instruments.

References

Asian Development Bank (ADB). 2021. *Asian Development Outlook (ADO) 2021 Supplement: Renewed Outbreaks and Divergent Recoveries*. July. https://www.adb.org/sites/default/files/publication/715491/ado-supplement-july-2021.pdf.

ADB. 2020. *Green Finance Strategies for Post COVID-19 Economic Recovery in Southeast Asia*. Manila. https://www.adb.org/sites/default/files/publication/639141/green-finance-post-covid-19-southeast-asia.pdf.

ADB. 2018. *The Korea Emissions Trading Scheme: Challenges and Emerging Opportunities*. Manila. https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf.

S. Alam. 2019. *Carbon Pricing to contribute to Greenhouse Gas mitigation efforts of Bangladesh: Design features and Rationale*. Berlin: Ecologic Institute.

J.E. Aldy and R.N. Stavins. 2012. The promise and problems of pricing carbon: Theory and experience. *The Journal of Environment & Development*. 21(2). pp. 152–180.

E. Ares, A. Broughton, and E. Kirk-Wade. 2021. *Estimates Day Debate: COP26 Climate Conference*. Briefing produced ahead of the Estimates Day debate to be held in the Commons Chamber. United Kingdom. 9 March. https://researchbriefings.files.parliament.uk/documents/CDP-2021-0033/CDP-2021-0033.pdf.

Association of Southeast Asian Nations (ASEAN). Enhancing ASEAN Connectivity. Initial Pipeline of ASEAN Infrastructure Projects. https://asean.org/?static_post=enhancing-asean-connectivity-initial-pipeline-asean-infrastructure-project.

A. Baranzini et al. 2016. Seven reasons to use carbon pricing in climate policy. *Centre for Climate Change Economics and Policy Working Paper*. No. 253. United Kingdom: London School of Economics and Political Science. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2016/02/Working-Paper-224-Baranzini-et-al.pdf.

J.V.D. Bergh and W. Botzen. 2020. Low-carbon transition is improbable without carbon pricing. *Proceedings of the National Academy of Sciences*. 117(38). pp. 23219–23220.

R. Best, P.J. Burke, and F. Jotzo. 2020. Carbon Pricing Efficacy: Cross-Country Evidence. *Environmental and Resource Economics*. 77(1). pp. 69–94.

A. Bowen. 2015. Carbon pricing: how best to use the revenue? *The Grantham Research Institute on Climate Change and the Environment Policy Brief*. November. London: London School of Economics and Political Science.

S.F. Burke and A. Bowen. 2020. Pricing carbon during the economic recovery from the COVID-19 pandemic. *Grantham Research Institute on Climate Change and the Environment Policy Brief.* May. London: London School of Economics and Political Science. https://www.lse.ac.uk/granthaminstitute/publication/pricing-carbon-during-the-economic-recovery-from-the-covid-19-pandemic/.

F. Chen et al. 2019. Long-term cross-border electricity trading model under the background of Global Energy Interconnection. *Global Energy Interconnection*. 2 (2). pp. 122–129.

H. de Coninck et al. Forthcoming. Strengthening and Implementing the Global Response. In V. MassonDelmotte, et al, eds. *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*.

Carbon Pricing Leadership Coalition. Washington, DC. https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

F. Convery, L. Dunne, and D. Joyce. 2013. Ireland's Carbon tax and the Fiscal Crisis. *OECD Environment Working Papers*. No. 59. Paris: Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/environment-and-sustainable-development/ireland-s-carbon-tax-and-the-fiscal-crisis_5k3z11j3w0bw-en;jsessionid=FLOFaph1UKBopdENFTL-SGlt.ip-10-240-5-173.

E. Dabla-Norris et al. 2017. Fiscal Policies to Address Climate Change in Asia and the Pacific. *IMF Departmental Paper Series*. No. 21/07. Washington, DC: International Monetary Fund.

B. Doda, A. Boute, and J. Ewing. 2021. *Carbon Pricing Potential in East and South Asia. German Environment Agency. Interim Report*. https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-05-19_cc_40-2021_carbon_pricing_asia.pdf.

V.K. Duggal. 2021. *Carbon Pricing*. Background note prepared for the report Asian Development Outlook 2021: Financing a Green and Inclusive Recovery. Manila: ADB. https://www.adb.org/sites/default/files/institutional-document/691951/ado2021bn-carbon-pricing-developing-asia.pdf.

Ecofys, The Generation Foundation, and Carbon Disclosure Project. 2017. How to guide to corporate internal carbon pricing – Four dimensions to best practice approaches. Prepared under the Carbon Pricing Unlocked partnership between the Generation Foundation and Ecofys in collaboration with Carbon Disclosure Project.

J. Edmonds et al. 2019. *The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges*. International Emissions Trading Association, University of Maryland, and Carbon Pricing Leadership Coalition. Washington, DC. https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

European Commission. 2021. Carbon Border Adjustment Mechanism: Questions and Answers. https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661.

K. Georgieva. 2021. *Securing a Green Recovery: The Economic Benefits from Tackling Climate Change.* Speech given during the People's Bank of China–International Monetary Fund High-Level Seminar on Green Finance and Climate Policy. Washington, DC. 16 April. https://www.imf.org/en/News/Articles/2021/04/15/sp041521-securing-a-green-recovery#_edn1.

Government of Ireland, Department of Public Expenditure and Reform. 2020. *Budget 2021 Tax Policy Changes*. http://budget.gov.ie/Budgets/2021/Documents/Budget/BUDGET%2021_Tax%20Policy%20Changes.pdf.

Government of the Republic of Korea, Ministry of Economy and Finance. 2020. Government Releases an English Booklet on the Korean New Deal. Republic of Korea. 28 July. https://english.moef.go.kr/pc/selectTbPressCenterDtl.do?boardCd=N0001&seq=4948.

C. Hood. 2013. Managing interactions between carbon pricing and existing energy policies. Guidance for Policymakers. *Insight Series 2013*. Paris: International Energy Agency.

B. Huber. 2013. How Did RGGI Do It: Political Economy and Emissions Auctions. *Ecology LQ*. 40: 59. https://scholarship.law.nd.edu/law_faculty_scholarship/473.

International Carbon Action Partnership (ICAP). 2021. Indonesia launches voluntary ETS trial for power sector. 20 March. https://icapcarbonaction.com/en/news-archive/764-indonesia-launches-voluntary-ets-trial-for-power sector#:~:text=ETS%20Library,Indonesia%20launches%20voluntary%20ETS%20trial%20for%20power%20sector,from%20March%20to%20August%202021.

ICAP. 2020. *Emissions Trading Worldwide: Status Report 2020.* https://icapcarbonaction.com/en/icap-status-report-2020.

ICAP. 2020. New law in Vietnam creates mandate for ETS. 17 November. https://icapcarbonaction.com/en/news-archive/730-new-law-in-vietnam-creates-mandate-for-ets.

International Energy Agency (IEA). 2021. The Role of China's ETS in Power Sector Decarbonization. Paris. https://www.iea.org/reports/the-role-of-chinas-ets-in-power-sector-decarbonisation.

IEA. 2021. After steep drop in early 2020, global carbon dioxide emissions have rebounded strongly. International Energy Agency. 2 March. https://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly.

IEA. 2020. Implementing Effective Emissions Trading Systems. Paris. https://www.iea.org/reports/implementing-effective-emissions-trading-systems.

International Emissions Trading Association. 2020. *2050 Vision: 2020 Greenhouse Gas Market Report*. https://www.ieta.org/GHG-Market-Report#Twenty_Twenty.

International Monetary Fund (IMF). 2019. Fiscal Policies for Paris Climate Strategies-from Principle to Practice. *International Monetary Fund Fiscal Affairs Department Policy Papers*. No. 19/010. Washington, DC: International Monetary Fund.

IMF. 2018. Assessing Fiscal Space: An update and stocktaking. https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/06/15/pp041118assessing-fiscal-space.

Intergovernmental Panel on Climate Change. Forthcoming. Summary for Policymakers. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the IPCC.* Cambridge University Press.

M. Joshi, D. Hurlbut, and D. Palchak. 2020. *Cross-Border Electricity Trading and Renewable Energy Zones*. Government of the United States, Office of Scientific and Technical Information. https://www.osti.gov/biblio/1659966.

M.N.O. Keohane and S.N. Olmstead. 2016. *Markets and the Environment*. Washington, DC: Island Press. p. 162. https://islandpress.org/books/markets-and-environment-second-edition.

K. Koatkutsu et al. 2016. Operationalizing the Paris Agreement Article 6 through the Joint Crediting Mechanism (JCM): Key Issues for Linking Market Mechanisms and the Nationally Determined Contributions (NDCs). *Institute for Global Environmental Strategies Discussion Paper*. May. https://iges.or.jp/en/pub/operationalizing-paris-agreement-article-6.

New Climate Institute and Data-Driven Enviro-Lab. 2020. Navigating the Nuances of Net Zero Targets.

I. Steel and T. Harris. 2020. *COVID-19 economic recovery: fiscal stimulus choices for lower-income countries.* London: Overseas Development Institute. https://www.odi.org/publications/17378-supporting-economic-recovery-covid-19-fiscal-stimulus-challenges-and-options-lower-income-countries.

Organisation for Economic Co-operation and Development (OECD). 2021. *Revenue Statistics in Asia and the Pacific 2021: Emerging Challenges for the Asia-Pacific Region in the COVID-19 Era*. Paris: OECD Publishing. https://doi.org/10.1787/ed374457-en.

OECD. 2020. Green budgeting and tax policy tools to support a green recovery. 9 October. https://read.oecd-ilibrary.org/view/?ref=137_137215-2knww1hckd&title=Green-budgeting-and-tax-policy-tools-to-support-a-green-recovery&_ga=2.43132069.1805502108.1620909552-591323893.1590292922.

OECD. 2019. OECD Environmental Performance Reviews, OECD Green Growth Policy Review of Indonesia 2019.

H.G. Paltier. 2017. Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. https://ideas.repec.org/a/eee/ecmode/v61y2017icp439-447.html.

Partnership for Market Readiness (PMR). 2021. Carbon Pricing Assessment and Decision-Making. A Guide to Adopting a Carbon Price. International Bank Reconstruction and Development/The World Bank: Washington, DC.

PMR, Carbon Pricing Leadership Coalition. 2018. Guide to Communicating Carbon Pricing. World Bank: Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO.

F. Rodyanto and A. S. Suwana. 2021. Putting A Price On Emissions: Indonesian Government Plans To Impose Carbon Tax. *Mondaq*. 28 July. https://www.mondaq.com/renewables/1096108/putting-a-price-on-emissions-indonesian-government-plans-to-impose-carbon-tax.

D. Rosenbloom et al. 2020. Opinion: Why carbon pricing is not sufficient to mitigate climate change—and how "sustainability transition policy" can help. *Proceedings of the National Academy of Sciences*. 117(16). pp. 8664–8668.

R.N. Stavins. 2019. Carbon Taxes vs. Cap and Trade: Theory and Practice. Harvard Project on Climate Agreements. https://www.belfercenter.org/publication/carbon-taxes-vs-cap-and-trade-theory-and-practice.

N. Stern. 2021. G7 leadership for sustainable, resilient and inclusive economic recovery and growth: An independent report requested by the UK Prime Minister for the G7. London: London School of Economics and Political Science.

J. Tirole. 2016. Carbon Pricing for a Climate Coalition. Toulouse School of Economics and Institute of Advanced Studies in Toulouse. 10 June.

S. F. Verde et al. 2020. Achieving Zero Emissions Under a Cap-And-Trade System. *Florence School of Regulation Climate Policy Brief*. No. 26. Florence: Robert Schuman Centre for Advanced Studies– European University Institute.

World Bank. 2020. State and Trends of Carbon Pricing 2020. https://openknowledge.worldbank.org/handle/10986/33809.

World Bank. 2019. Using Carbon Revenues. World Bank; Washington DC.

M. Vaidyula and E. Alberola. 2016. *Recycling carbon revenues: transforming costs into opportunities*. 31 May. Paris: Institute for Climate Economics.

A. Yokoyama, K. Ueta, and K. Fujikawa. 2000. Green tax reform: converting implicit carbon taxes to a pure carbon tax. *Environmental Economics and Policy Studies*. 3(1). pp. 1–20.

Carbon Pricing for Green Recovery and Growth

Carbon pricing is a key element of the broader climate policy architecture that can help countries reduce their greenhouse gas (GHG) emissions cost-effectively, while mobilizing fiscal resources to foster green recovery and growth. This publication introduces carbon pricing instruments and provides insights on how they can be designed to stimulate and not constrain economic activity in the context of recovery from the coronavirus disease (COVID-19) pandemic. It aims to help countries design and implement an efficient climate change response. The publication underscores the important role of carbon pricing in achieving nationally determined contributions and developing road maps for longer-term net-zero GHG emission targets.

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ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org