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APEC Economic Policy Report 2022

Structural Reform and a Green Recovery
from Economic Shocks

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APEC ECONOMIC POLICY REPORT 2022

**Structural Reform and a Green Recovery
from Economic Shocks**

APEC Economic Committee

November 2022

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Note: The terms “national”, “nation” used in the text are for purposes of this report and do not imply the “political status” of any APEC member economy.

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PREFACE

The world today faces many environmental challenges which have increasingly put into risk the sustainability of our planet. In recent years, there has been growing awareness of issues such as climate change; air, water and soil pollution; waste generation; deforestation and forest degradation; and depletion of natural resources, as well as a wide range of other environmental issues. Undeniably, they are global problems and require global solutions.

At the same time, APEC economies are focusing on recovering from the adverse economic and social impacts of the COVID-19 pandemic. By mid-August 2022, more than 590 billion cases of COVID-19 and more than 6 million deaths related to COVID-19 had been shockingly recorded. Moreover, the pandemic disrupted lives across all economies and hampered global economic growth. Many companies had to adjust their operational plans or close down, which caused job and income losses, leading to increasing inequality among and within economies.

There is a sense of urgency in addressing effectively both the COVID-19 pandemic and the environmental challenges. Structural reforms could not only facilitate social and economic recovery, but also ensure environmental sustainability at the same time. This year's APEC Economic Policy Report (AEPR) aims to support APEC member economies' efforts in addressing these challenges by analyzing policy approaches in the response and recovery phases from the pandemic; identifying structural reforms through green recovery lens; and providing a general framework which outlines policy instruments and processes that are essential to effectively contribute to a green recovery. In addition, it provides recommendations on areas where capacity-building and knowledge-sharing activities could be accentuated within APEC to facilitate a smooth transformation towards a green economy.

This report was made possible through generous funding provided by Australia and New Zealand. I would like to express my gratitude to the AEPR 2022 Core Team members: Australia; Canada; China; Indonesia; Japan; New Zealand; Russia; Chinese Taipei; Thailand; and the United States, and especially to New Zealand's Annette Gittos for taking the role of Core Team Lead. I also would like to thank the APEC Secretariat's Program Director for the Economic Committee, Felicity Hammond, for her valuable advice throughout the process, and the APEC Policy Support Unit for managing the production of the main report. The report was written by a team at Sapere Research Group comprising Veronica Jacobsen, Corina Comendant, Kevin Woock and Rory McLeod, and Carlos Kuriyama from the APEC Policy Support Unit. Sylwyn C. Calizo Jr. provided excellent editorial and research assistance. This report has also benefited from inputs of members of the APEC Economic Committee, and the peer-review by the International Monetary Fund, in particular by Florence Jaumotte, Carlo Pizzinelli, Hugo Rojas-Romagosa and Sneha Thube.

The AEPR 2022 provides a positive contribution to the discussion of structural reforms and the need to bolster a green socioeconomic recovery, advancing the Enhanced APEC Agenda on Structural Reform (EAASR) as well as the Aotearoa Plan of Action to implement the Putrajaya Vision 2040. It is my hope that this report encourages a broader discussion on this matter and serves as a useful reference to policymakers in the design and implementation of policies to support a green transition as a path to achieve sustainable growth.

James Ding
Chair, APEC Economic Committee

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ABBREVIATION LIST

ABAC	APEC Business Advisory Council
ADB	Asian Development Bank
ADR	Alternative Dispute Resolution
AEPR	APEC Economic Policy Report
ANSSR	APEC New Strategy on Structural Reform
APEC	Asia-Pacific Economic Cooperation
BCG	Bio-Circular-Green
B2B	Business to Business
COVID-19	Coronavirus Disease 2019
CO ₂	Carbon Dioxide
EAASR	Enhanced APEC Agenda for Structural Reform
ECIPE	European Centre for International Political Economy
ESG	Environmental, Social and Governance
ETF	Exchange-Traded Funds
FMP	Finance Ministers' Process
GDP	Gross Domestic Product
GEA	Green Economy Agreement
GEI	Green Economy Indicators
GHG	Greenhouse Gas
GPP	Green Public Procurement
GRP	Good Regulatory Practice
GSI	Global Subsidy Initiative
HDI	Human Development Index
ICC	International Chamber of Commerce
IER	Individual Economy Report
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IPCCC	Intergovernmental Panel on Climate Change
ITQ	Individual Transferable Quota
JCM	Joint Crediting Mechanism
kWh	Kilowatt Hour
LAISR	Leaders' Agenda to Implement Structural Reform
MRV	Measurement, Reporting and Verification
MSME	Micro, Small and Medium Enterprises
ODR	Online Dispute Resolution
OECD	Organisation for Economic Co-operation and Development
PSU	Policy Support Unit (APEC)
R&D	Research and Development
RAASR	Renewed APEC Agenda on Structural Reform
REP	Recycling and Extended Producer Responsibility
ROW	Rest of the World
UNEP	United Nations Environment Programme
WHO	World Health Organization
WELS	Water Efficiency Labelling and Standards

KEY MESSAGES

- APEC members face two key challenges. The first is to repair the economic damage caused by the COVID-19 pandemic, particularly in terms of slower growth and higher economic inequality. With fiscal and monetary policy responses potentially reaching safe limits, governments should seek to implement policies aimed at structural reform to achieve these objectives. The second challenge is to respond to climate change and other environmental threats.
- The main purpose of this report is to begin a discussion among APEC members about how structural reform policies, which are aimed at improving the conditions for growth, could also be used as an effective response to environmental threats and provide for the greening of our economies. These policies should continue to be useful in the longer term as APEC members seek to formulate responses to future economic shocks.
- Economic shocks have many causes (e.g., financial crises, pandemics and natural disasters), and can broadly be categorised as supply shocks, which make production more costly, and demand shocks, which suddenly reduce consumer spending and business investment. The economic shock caused by COVID-19 is unusual in that it is simultaneously a supply shock and a demand shock.
- The Asia-Pacific region faces a long list of environmental challenges, including climate change, waste and pollution (air, water and soil), deforestation, public health issues, natural resource depletion and uncertain energy security. In the vital area of climate change, the region as a whole is responsible for massive emissions, even as many APEC members, particularly developing members, are among the most exposed to the effects of climate change.
- As APEC economies seek to recover from economic shocks such as those emanating from the effects of COVID-19, the opportunity to embark on green structural reforms has never been more timely and critical. However, APEC members, both developed and developing, are only just beginning to carry these out. This is because the area involves significant complexity and uncertainty; and sound analytical frameworks as well as reliable data are only now starting to be developed. While green structural reforms will need to be tailored to the specific circumstances and priorities of individual economies, there are many areas where APEC economies can learn from each other as they seek to meet the challenges involved.
- In the area of public sector governance, a major challenge is creating a favourable political environment for reform in the face of vested interests, public opposition and the fact that many of the benefits of reform would only be realised over the longer term. The discrepancy between the long-term benefits of green structural reforms and the short-term adjustment costs and investments suggests that delivering on the reform would require strong political commitment and significant institutional and capability development within governments.
- In terms of structural reforms, governments increasingly seek to improve the functioning of markets to support greater environmental sustainability. In particular,

governments aim to address externalities and public good issues in markets involving natural resources through legislation, fiscal incentives and programs. In addition, governments need to provide the necessary conditions to encourage capital and infrastructure investments moving forward in terms of innovative, circular and net-zero solutions to help advance green economic recovery and climate action.

- Each policy area covered by the APEC Economic Committee can make significant contributions to such reforms. *Competition policy and law*, by focusing on efficiency and innovation, could seek to improve competition in markets so that resources are consumed more efficiently and barriers facing competing new, green technologies are removed. Competition agencies could, in particular, deal with arrangements between firms interested in cooperating to improve environmental outcomes. And, consumer protection law could ensure that consumers make an informed choice on the sustainability attributes of the products they consume.
- Regulatory reforms and regulatory stewardship have a central role to play in improving the functioning of markets. Markets should provide price signals that better reflect the true costs of environmental externalities and public goods. A range of instruments could be employed toward this goal, including but not limited to green taxes, reduction of environmentally harmful subsidies (particularly fossil fuel subsidies) and improvements to property rights, particularly in such areas as emissions trading, land access, water management and the rights to fisheries resources. Price signals could also be complemented by non-price measures such as pollution or resource use limits and performance standards. Regulatory systems and well-designed regulations create spaces for innovation and the emergence of novel industries aligning better with environmental objectives.
- *Corporate law and governance* could contribute by ensuring that governments, businesses and consumers work together to reward the greening of the economy through increased demand for sustainable products and services and more favourable finance. *Strengthening the economic and legal infrastructure* could greatly improve the efficiency of economic processes and catalyse new green supply chains and enterprises in which businesses and consumers are involved, thereby reducing pressure on resource use.
- For structural reforms to succeed, there is a need for the different parts of government to work more coherently and cohesively. Government officials in charge of structural reforms will need to work together and coherently with those in charge of government policies in specific fields, including innovation and public procurement; investment and access to financing; information provision; and skills development. Many of these reforms could also support the emerging area of green industrial policy, which seeks to transform the economy by supporting domestic industries that produce green or greener goods and use greener production methods. There will also be a need to employ ‘just transition’ policies to support those members of society that are disadvantaged by the reforms, particularly over the shorter term.
- Over the longer term, however, the benefits of this mix of policies will be immense. It has been argued that there are tensions and trade-offs between growth and environmental sustainability. This report supports the contrasting view that structural

reforms to promote sustainable outcomes can also promote higher rates of growth. This makes meeting the shorter term policy challenges all the more important.

Recommendations

Implementing green structural reforms requires the utilisation of multiple instruments, covering several areas under the responsibility of different government institutions. The complexity of the process in the context of climate change makes it essential to have a whole-of-government approach, where policy decisions are properly coordinated inter-institutionally to ensure a higher rate of success.

Any structural reform process includes trade-offs. The success of structural reforms would rely on suitable management of the political economy to maximise utility, resource utilisation and consultation with affected groups, and to prevent interest groups from stopping, slowing down, or reversing the reforms. Sequencing of policy measures is very important. Governments need to build up a pro-reform constituency and work to maintain the momentum by implementing policies with short-term deliverables that could help achieve medium- and long-term objectives. A solid communication strategy, married with transparent, evidence-based policy, is essential to explain the benefits of reform and the costs of inaction to relevant constituencies.

Starting with structural reforms that could be developed and implemented more readily, and meet with early success, could boost the push for reform. However, governments have to avoid a situation wherein those benefiting from the initial reforms would not push for further reforms for fear of losing the gains from the first wave of reforms.

Continuous, consistent and predictable policies are needed for effective green structural reforms. The participation of the business community and consumers is important to transform the economy into a greener one. Resolving environmental challenges is a long-term process and policy uncertainty is one of the main barriers to transitioning into a green economy.

Skills are also required, in government as well as the private sector, to effectively implement the green structural reforms that are integral to the transition toward a low-carbon economy. In this sense, capacity building is an essential structural reform component and this is where APEC's comparative advantage resides.

APEC could emphasise core capacity-building and knowledge-sharing activities in areas where more work is needed to transform toward a green economy. Based on the findings of this report, potential capacity-building programmes relate to topics mainly within the purview of the Economic Committee and Senior Finance Officials, among others. Examples include:

- Learning how to develop pricing schemes (for instance, carbon pricing).
- Getting a better understanding on the process to develop and implement green regulatory measures, including complementary enabling policies.
- Strengthening collaboration with the private sector.
- Strengthening inter-institutional collaboration within and across economies.
- Reducing information asymmetries among different actors (for instance, government and industries, firms and consumers, and inter-sectoral firms).
- Mobilising finance toward green investments, keeping in mind competitive and well-structured green investment projects.

In addition, APEC provides the stage for economies to exchange information on their experience with implementing measures to transition toward a green economy. Economies could learn from each other in areas such as identifying proven technologies and business models toward which investments should be focused. Capacity-building efforts could encourage regulatory cooperation and labour mobility agreements to help growing sectors that are becoming more relevant in this transition. These include renewable energy, recycling and product stewardship services.

1. INTRODUCTION

PURPOSE

‘Structural Reform and a Green Recovery from Economic Shocks’ is the topic of this 2022 APEC Economic Policy Report (AEPR) report.¹ It is designed to assist APEC member economies in their individual consideration of structural policies and tools that will promote a more sustainable recovery from future economic shocks. Given the current context, the report pays particular attention to the structural reforms that would allow member economies to promote recovery from the economic slowdown caused by COVID-19, while at the same time creating the market conditions to effectively combat the shock of climate change and other environmental challenges.

APEC Leaders gave the highest priority to future APEC work on economic recovery from COVID-19 and on tackling climate change in their 2021 Declaration (APEC 2021c). Until recently, there had been an assumption that tensions and trade-offs exist in seeking to promote progress in both these areas at the same time. This report will show that this assumption is increasingly open to challenge and that structural reforms to promote sustainable outcomes will also deliver higher rates of growth. This is because such reforms can provide for consistent pricing of environmental damage, market signals that will promote innovation and the adoption of cleaner technologies, and increased certainty for market participants, particularly over the longer term.

Given that fiscal responses to the current economic slowdown are under pressure and limited in providing macroeconomic stability against these challenges, there are increasingly calls for structural reform to ensure that growth does not occur at an unacceptable cost to our natural systems. The situation, therefore, represents a unique opportunity for APEC member economies to undertake such reforms in a manner that would also contribute significantly to the fight against climate change.

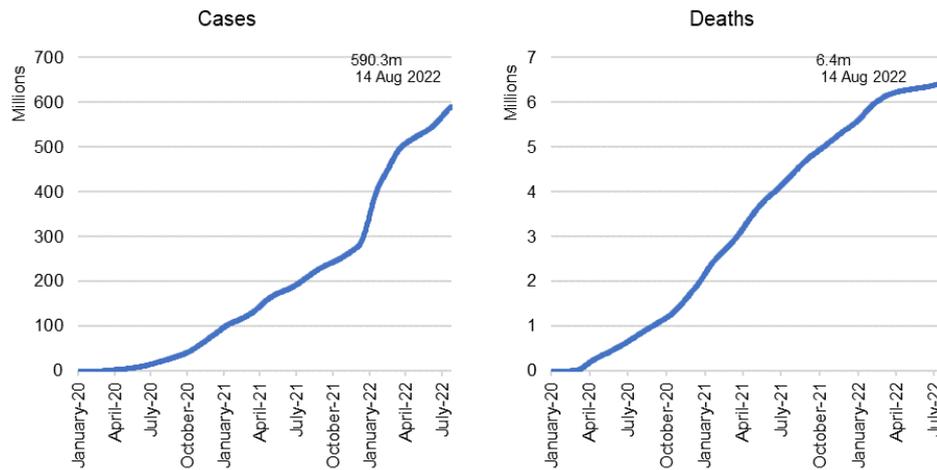
THE TWIN CHALLENGES OF COVID-19 AND CLIMATE CHANGE

COVID-19

COVID-19 has been the most significant pandemic event in the past century and has caused massive suffering and disruption. As of 14 August 2022, there have been more than 590 million cases of COVID-19 worldwide along with over 6.4 million COVID-related deaths (WHO n.d.; see Figure 1.1). The pandemic has disrupted lives across all economies and communities and negatively affected global economic growth beyond almost anything experienced in nearly a century. In 2020, global GDP fell by 3.4 percent before beginning to recover, although still at lower rates of growth than prior to the pandemic (World Bank 2020b).

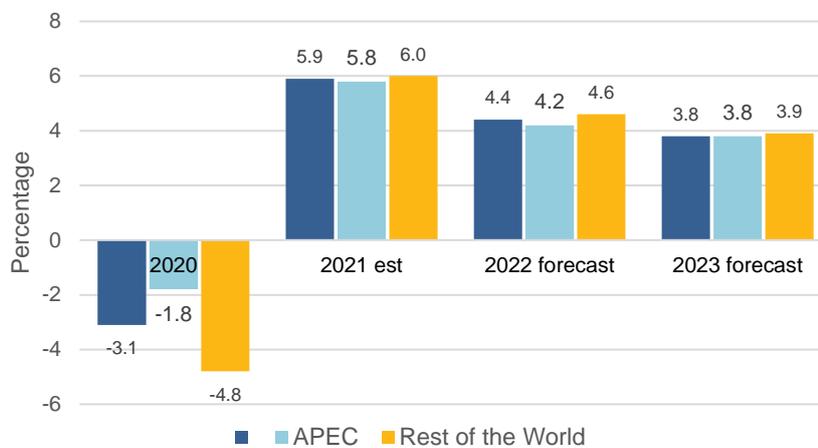
¹ In this report, ‘green’ refers to the potential to combat the impacts of climate change and other environmental challenges. Green objectives include reducing greenhouse gas (GHG) emissions, decreasing environmental pollution, implementing sustainable management of environmental resources, and increasing resilience to the impacts of climate change.

Figure 1.1 Cumulative COVID-19 cases and deaths worldwide



Source: Our World in Data, using Center for Systems Science and Engineering (CSSE) at Johns Hopkins University COVID-19 data, accessed 16 August 2022, <https://ourworldindata.org/>.

Figure 1.2 Year-on-year real GDP growth (%)



Source: APEC PSU (2022).

In terms of growth, the APEC region has fared better than the rest of the world. Growth fell by 1.8 percent in 2020 before recovering to 5.8 percent in 2021. Forecast growth for the region is 4.2 percent in 2022 and 3.8 percent in 2023 (see Figure 1.2).

But a report by the APEC Policy Support Unit (APEC PSU 2022) notes that these forecasts have been revised downwards and that significant downside risks persist. These include:

- *Significant uncertainty around the trajectory of COVID-19.* With the rapid spread of new variants across the region, public health measures are being either maintained or adapted in response. These have caused ongoing disruption to supply chains.
- *Growing limits on the ability of APEC member economies to apply fiscal policy instruments to the crisis.* Many economies have applied a massive fiscal response to mitigate the health and economic repercussions of COVID-19, but this has resulted in

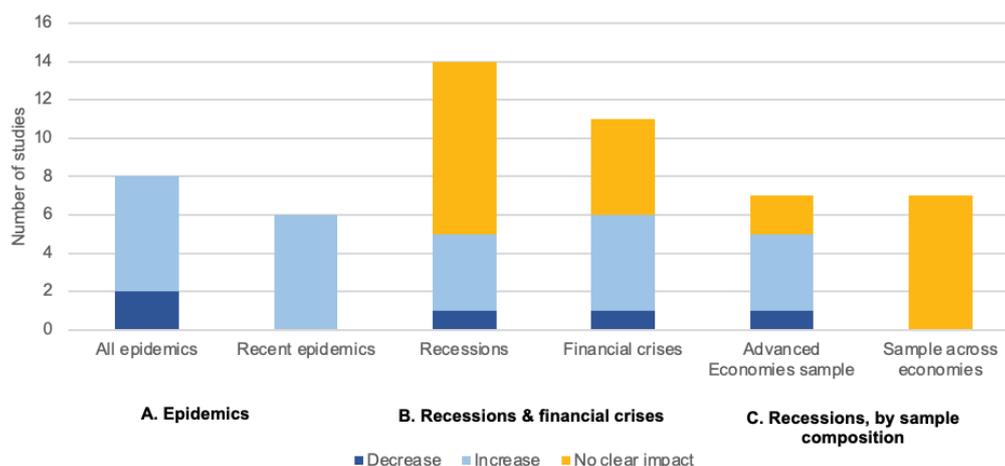
higher debt. In the APEC region, the average general gross debt incurred by governments rose to around 65 percent of GDP in 2020, significantly higher than the pre-pandemic 10-year average of 49 percent. In the near-term period, gross government debt could increase again to 66–67 percent. This points to the need for a much more targeted approach to fiscal policy in the context of ‘tapering’ of overall support.

- *Growing limits on the ability of the central banks of APEC member economies to apply monetary policy instruments to the crisis.* To date, expansive monetary policies have been applied to combat the crisis in terms of lower benchmark interest rates and expanded money supply. However, in 2021 and early 2022, commodity prices have risen rapidly, particularly for energy and food. This has fed into increased inflation with a doubling of APEC’s inflation rate to an estimated average of 3.0 percent in 2021 from 1.5 percent in 2020. Some central banks have already started to tighten monetary policies in an attempt to ensure that inflationary expectations do not become entrenched. However, this strategy carries with it the risk of economic downturns and possible recession.

There is also preliminary evidence that the economic slowdown caused by the pandemic is leading to increased income inequality both between and within member economies. Developing economies were initially particularly vulnerable to the crisis given in many cases lower accessibility to vaccines, as well as more limited fiscal and monetary options to combat the crisis. The decline in global trade has exacted an especially heavy economic toll on trade-dependent developing economies. Preliminary evidence from a literature review of 32 studies on inequality after an event such as epidemics, recessions and financial crises also indicates that the pandemic is causing inequality within member economies to rise because of particularly severe job and income losses among lower income groups (see Figure 1.3). Over the medium term, rising food price levels as well as significant disruptions to education services may further raise levels of inequality (World Bank 2020b).

As APEC members emerge from the health crisis, they will be under pressure to put in place productivity-enhancing structural reforms both to support future growth and to address growing inequality. These reforms will need to target providing employment and opportunities for poorer and disadvantaged groups in order to improve the economic resilience of member economies in the future.

Figure 1.3 Inequality after an event



Source: World Bank (2020b).

Climate change

The environment is essential for every economic activity and for life itself. Current patterns of economic activity are characterised by the mismanagement and depletion of natural capital, creating risks of further environmental and atmospheric damage. Maintaining the ability of the natural world, including resource stocks, land and ecosystems, to support economies and human well-being in the face of future environmental shocks (such as natural disasters) or economic shocks (such as spikes in commodity prices) is a key motivation for policies that support green growth. In this regard, governments have an important role in providing predictable and stable long-term policy frameworks that reduce uncertainties and related investment risks for the private sector in developing new sources of growth from green markets and activities.

The November 2021 APEC Regional Trends Analysis (APEC PSU 2021) states that:

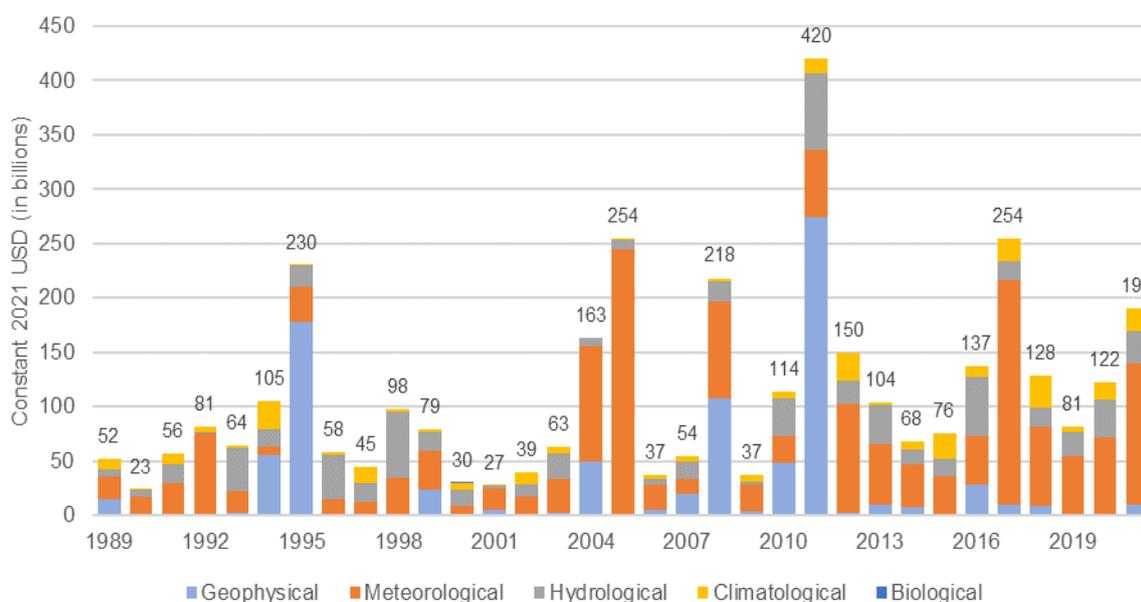
Climate change is an existential threat not only for the APEC region, but for humanity as a whole. The discussion is no longer about how to prevent climate change; the world has done too little too late for that. The question now is how to keep anthropogenic climate change – that is, climate change due to human activity – within levels that will allow our species to survive on this planet in the long term.

According to the Sixth Assessment Report published in 2021 by the Intergovernmental Panel on Climate Change (IPCC 2021), Asia has seen an increase in surface temperature in recent years beyond the range measured in 1850–1990. This means heatwaves, wildfires, extreme weather events and heavy precipitation will be more frequent and intense over much of Asia in the coming years (IPCC 2021). Based on data from the Emergency Event Database (EM-DAT), since APEC's inception in 1989, the APEC region has been affected by 36 percent of the total natural disasters in the world; and disaster-related losses in the APEC region amounted to an average of USD 111 billion annually (see Figure 1.4).² Because of its location and geographic diversity, the APEC region is heavily exposed to the impacts of climate change³.

² Natural disasters are geophysical, meteorological, hydrological, climatological or biological events that have fulfilled any of the following: (1) 10 or more people deaths; (2) 100 or more people affected/injured/homeless; or (3) declaration by an economy of a state of emergency and/or an appeal for international assistance.

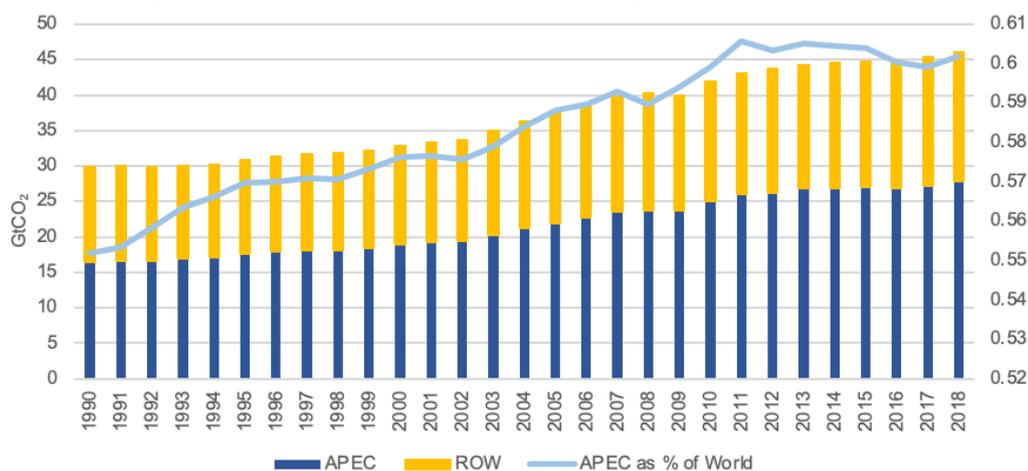
³ Climate change is not just one of many environmental threats, but also a complex global issue including both environmental and non-environmental components.

Figure 1.4 Total damages caused by natural disasters in the APEC region, 1989–2021



Source: Emergency Event Database (EM-DAT), accessed 2 August 2022, <https://www.emdat.be>; APEC PSU calculations.

Figure 1.5 Total GHG emissions (CO₂ equivalent), 1990–2019

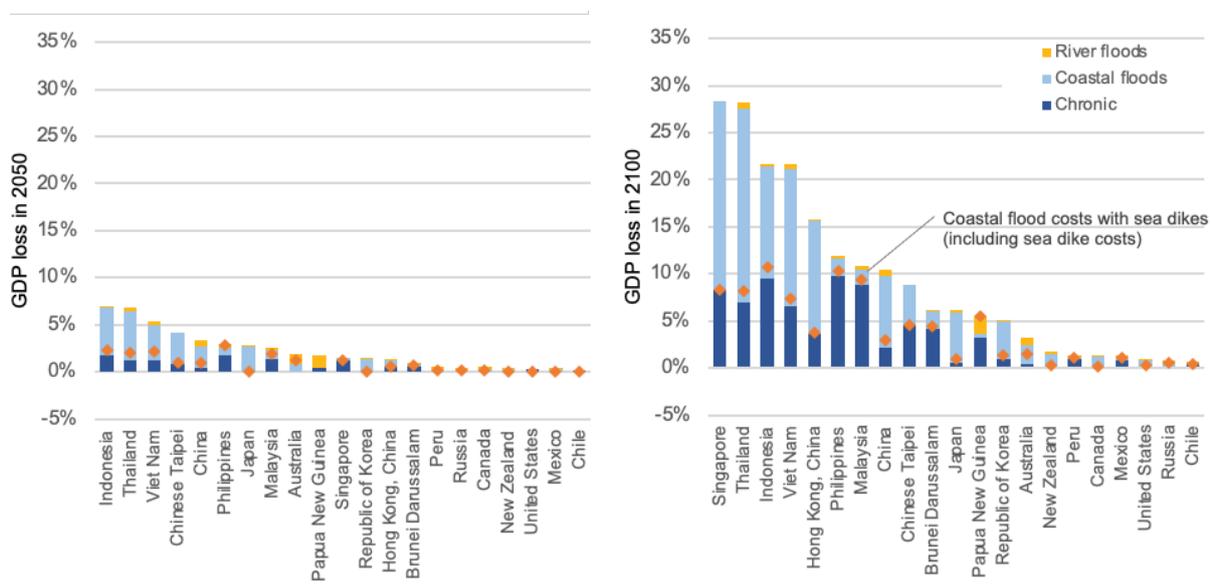


GHG=greenhouse gas; GtCO₂=billion tonnes of carbon dioxide.
Source: APEC PSU (2021).

The APEC region is also a key contributor to climate change (see Figure 1.5). Between 1990 and 2018, the region’s greenhouse gas (GHG) emissions increased from 16.5 to 27.8 gigatonnes of carbon dioxide equivalent, an annual average growth of 1.9 percent. During the same period, GHG emissions in the rest of the world grew at an average rate of 1.1 percent annually. As a result, APEC’s share of GHG emissions increased from 55 percent in 1990 to 60 percent in 2018.

Such developments point to a considerable economic cost. Drawing on existing modelling, the World Bank (2020a) has estimated the growth effects of climate change for APEC economies. Across APEC, losses of 7.3 percent of GDP are expected under the baseline scenario by 2100. Developing economies near the equator are likely to experience the largest economic losses, primarily due to coastal flooding (see Figure 1.6). Indonesia; Singapore; Thailand; and Viet Nam could each experience losses of more than 20 percent of GDP by 2100. Developed member economies located in higher latitudes, including Australia; Canada; the Republic of Korea; New Zealand; and the United States, are expected to see lower losses, of less than 5 percent of GDP by 2100.

Figure 1.6 Economic impacts of flooding under baseline scenario



Source: World Bank (2020a).

Many of the economies with the largest losses are developing ones. However, there is considerable variation across APEC as to the source of losses and relative exposure to impacts of flooding. While coastal flooding in China; Hong Kong, China; and Singapore could result in losses of more than 15 percent of GDP, river flooding is likely to cause the larger impacts in Australia and Papua New Guinea, with losses of 2 percent and 0.8 percent of GDP by 2100 respectively (World Bank 2020a).

The World Bank (2020a) forecasts that the key causes of GDP losses will be:

- *Reduced labour productivity*, particularly in the manufacturing and agricultural sectors, from higher average temperatures. The rise in temperatures also increases the disease burden, making labour less productive. The economic implications are likely to be greatest in member economies with larger agricultural and manufacturing sectors and those with higher baseline temperatures.
- *Reduced agricultural yields*, since yields are sensitive to climatic variables, including temperature, precipitation patterns and drought. Agricultural production is likely to be negatively impacted in most APEC member economies because of climate change. The expected impact varies across crops and economies, with the expected effect greatest for APEC economies nearest the equator. Agricultural output in the temperate zone economies may yet increase.

- *Inundation of low-lying coastal lands* from higher average temperatures which are virtually certain to cause rising sea levels. The most severe reductions in available land are expected in the territorially small coastal economies of Singapore (7.7 percent of land lost) and Hong Kong, China (4.4 percent of land lost). The impacts could be larger or smaller, with uncertainty in the response of polar ice sheets to climate change.

While developing economies are likely to suffer more from climate change, disproportionate impacts will also be felt by poor and marginalised groups in all economies (APEC PSU 2021; Kartha et al. 2020). Compared to men, women’s mortality risk during disasters is 14 times higher, and the impacts are more pronounced for poor women who are more vulnerable to climate-sensitive health risks (African Development Bank et al. 2002; Neumayer and Plümper 2007; Peterson 2007; Uji 2012). Indigenous peoples and those living in rural and remote areas like mountains, and deltaic and coastal regions, are also more likely to suffer from more severe consequences of climate change, such as sea level rise, desertification, landslides, fires and loss of biodiversity (Inter-Agency Support Group on Indigenous Peoples’ Issues 2008).

APEC economies are implementing policy reforms to respond to these challenges, including reducing fossil-fuel energy consumption and fostering renewable energies to reduce emissions; promoting ocean and forest conservation; adaptation planning policies; and helping communities adapt to changing weather patterns.

STRUCTURAL REFORM IN APEC

Structural reforms seek to make markets work more effectively

A question that is perennially asked in APEC circles is what exactly is meant by structural reform? While definitions differ, it is generally agreed that structural reform refers to changes to domestic policies, rules and institutions that address impediments to the efficient operation of markets and the capacity of businesses to access markets and operate more productively. The impediments can take the form of poorly designed or outdated regulatory systems and competition and governance frameworks.

Close to the time that it began work on structural reform issues, the APEC Economic Committee defined structural reforms as ‘measures that change the institutional and regulatory framework in which businesses and people operate to help the market work efficiently’ (APEC Economic Committee 2006). Such measures include:

- improvements in regulation and institutions to enhance the efficiency with which markets operate, e.g., through good regulatory processes that encompass the views of key sectors of society.
- reducing transaction costs of market activity.
- regulation of product and service markets, e.g., licensing fees and other costs.
- regulation of labour markets.
- addressing limits on competition by reducing entry barriers and market structure.
- improved public sector administration, e.g., through better policy advice, sound laws and legal frameworks.

Structural reform is key to APEC's work programme

Right from its inception, APEC has recognised that policies to promote free and open trade, and investment and structural reform, are necessary complements in achieving regional economic integration. But a key feature of structural reform is that it must be developed in a manner that is specific to the circumstances of each individual APEC member economy and, as such, is dependent on unilateral action. Such reform can also be politically difficult, particularly as structural reform is not always distributionally neutral in its effects. APEC economies have proceeded on the basis that all economies can learn from each other in this field by sharing their experiences. They have also recognised that there is scope for assisting each other through individually tailored capacity-building programmes.

Although the 1995 Osaka Action Agenda mandated work programmes in such areas as competition policy and deregulation, a major step forward took place in 2004 when APEC leaders agreed to the Leaders' Agenda to Implement Structural Reform (LAISR). The APEC Economic Committee was repurposed to take forward the new work programme. The LAISR identified five work areas: regulatory reform, strengthening economic and legal infrastructure, competition policy, corporate governance, and public sector management. A sixth work area, 'ease of doing business', was added in 2009 when APEC leaders endorsed a target of achieving a 25 percent improvement in selected indicators on ease of doing business by 2015.

The mandate extended by the Leaders under this agenda expired in 2010; and they agreed on two new instruments to further advance APEC's structural reform work programme. These instruments widened the focus of APEC's structural reform work to include a range of issues that were also starting to be considered under APEC's trade and investment work programme. They were:

- *The 2011 APEC New Strategy on Structural Reform (ANSSR)*. This widened the focus of APEC's structural reform work to focus on such areas as labour market opportunities, social and safety net programmes, and women's and small to medium enterprise development.
- *The 2015 Renewed APEC Agenda on Structural Reform (RAASR)*. While stressing the importance of existing work areas such as regulatory reform, the RAASR further widened APEC's structural reform agenda to focus on new areas such as innovation (as the forerunner of digital policies), services, and the links between structural reform and inclusive growth.

Since its inception, APEC has been successful in providing a platform for the consideration of sensible structural reform policies within its member economies. It has also facilitated the development of specific structural reform policies and institutions, particularly for developing members in such areas as competition policy and law, good regulatory practice, and ease of doing business. Almost all APEC members have today put in place competition laws and enforcement structures. Most have also put in place many of the institutions, processes and mechanisms associated with good regulatory practices, such as regulatory impact analysis. Many have had clear success with APEC-sponsored cooperation aimed at improving the ease of doing business in developing economies (McLeod 2020).

Within APEC, the support given to structural reforms has been reinforced with the APEC Putrajaya Vision 2040, in which APEC member economies reaffirm their commitment to the pursuit of structural reforms to promote innovation as well as improve productivity and

dynamism (APEC 2020). The continuation of structural reform efforts is very important, as APEC has been less successful in encouraging its members to reform heavily restricted sectors, where there is potential for significant productivity gains. For example, APEC itself has identified services and the digital economy as two areas where significant reforms are required:

- *Services.* A seminal APEC PSU econometric study examined the effects of structural reforms to remove barriers to competition in air, maritime and road transport, electricity and gas, and telecommunications across all APEC economies (APEC PSU 2011). The study outlined a package of reforms which, across the APEC region, would have the effect of creating USD 175 billion in additional real income (in 2004 dollars). These gains alone would have been almost twice as high as the total gains that could have been achieved from the complete liberalisation of mercantile trade at that time (APEC PSU 2011). The findings were backed up by the 2016 AEPR on Structural Reform and Services, which showed high levels of restrictiveness in such services as air and maritime transport, logistics and courier, and telecommunications and broadcasting (APEC Economic Committee 2016). Furthermore, between 2008 and 2016, there was little evidence that APEC members had moved to reduce these restrictions, with most of the restrictions staying at about the same level and remaining high.
- *Digital technologies.* The 2019 AEPR on Structural Reform and the Digital Economy found a number of structural challenges, including the market power of digital platforms; regulations that inhibit competition between technologies; network and natural monopoly issues around telecommunications, spectrum and broadband; and lack of cross-border interoperability or harmonisation of regulatory approaches to data flows, data privacy and cybersecurity (APEC Economic Committee 2019). Meanwhile, the European Centre for International Political Economy (ECIPE) digital trade restrictiveness index shows that in the context of a rapidly rising number of restrictions, some APEC members maintain the most restrictive digital frameworks in the world (Ferracane, Lee-Makiyama and van der Marel 2018).

From APEC's inception, many APEC economies have enjoyed high growth rates based on the rapid rise of the production and export of manufactured goods. There are no clear signs that that process has run its course. For some time now, there has been a consensus within APEC that member economies will require market incentives to promote an equally rapid growth of key services sectors and harness the productivity benefits of the digital economy. APEC's own evidence base shows that structural reform would be required to achieve such outcomes (APEC PSU 2011).

However, the International Monetary Fund's (IMF) 2019 World Economic Outlook presents empirical evidence that the pace of structural reform in emerging markets and developing economies had slowed markedly in the past decade, and that this was having real implications for growth and convergence. Furthermore, the rate of the slowdown had been greater in the Asia-Pacific region than in other regions in the world other than sub-Saharan Africa. Overall, the study suggests that a structural reform package in areas such as governance, domestic and external finance, trade, and labour and product markets, might double the speed of convergence, raising annual GDP growth by about one percentage point for some years (IMF 2019).

STRUCTURAL REFORM AND A GREEN RECOVERY FROM ECONOMIC SHOCKS

A key question now facing APEC economies is what role structural reform should play in responding to the economic challenges posed by COVID-19. Eventually fiscal responses to the crisis will hit natural limits as government budgets and borrowing capacity are depleted. Similarly, there appear to be limits to the stimulus that monetary policy can provide.

There is little doubt, then, that structural reform will come to be seen as an important part of the toolkit for governments in responding to the crisis, particularly as public health restrictions are removed. Structural reform has the advantage in that it seeks to improve the efficiency of markets and the productivity of factors of production. It was employed widely as part of the response to previous economic crises, such as the Asian financial crisis in 1997 and the global financial crisis in 2008.

It was these crises that allowed governments to confront the political challenges of structural reform, in that they created winners and losers. Crises induce high public anxiety and uncertainty, which reduce part of the resistance to change (OECD 2009a). The collective stress during crises helps to unfreeze powerful, institutionalised perceptions, and to challenge the status quo (Boin and 't Hart 2022). In addition, Douglas (1990) notes that 'individual groups lose their own privileges, but simultaneously the aggregate cost of paying for the privileges of other groups in the economy is removed from them. It is hard to complain about damage to your own group when everyone else is suffering at least as much – and you benefit from their loss, in the medium term'.

Clearly APEC Economic Leaders and Ministers want the future structural reform agenda in APEC to incorporate work to tackle climate change, as well as address other environmental challenges. In agreeing to Aotearoa Plan of Action to implement the Putrajaya Vision 2040, APEC Leaders put structural reform as one of the first among the list of collective actions to be taken to combat climate change and other environmental challenges (APEC 2021b). The APEC Structural Reform Ministers met in 2021 to adopt APEC's current structural reform instrument, the Enhanced APEC Agenda for Structural Reform (EAASR) (APEC 2021a). In doing so, they also stressed the importance of structural reform to combat climate change and other environmental challenges. In the context of the need for structural reform efforts in response to the economic slowdown caused by COVID-19, they instructed that the 2022 AEPR should be on the topic of 'Structural Reform and a Green Recovery from Economic Shocks'.

Green structural reforms can be good for the environment and for growth

APEC work on structural reform and a green economic recovery should be seen as complementary to, rather than competing with, existing structural reform work on services and on the digital economy. Both have the potential to assist APEC members with the greening of their economies through innovation and the adoption of cleaner technologies.⁴ Green structural

⁴ Clean technologies refer to any product or service that contributes to green objectives. For example, clean technologies include those that significantly enhance energy efficiency, the sustainable use of resources, or the protection of the environment.

reforms facilitate the adjustment to economic activities that will cause less damage to the environment, in addition to creating conditions for improved growth in member economies.

But structural reform work on the greening of the economy will entail new challenges. It will require work on measures that will ensure that markets for environmental services in APEC member economies provide price signals and other incentives to ensure that economic activities reflect the long-run value of environmental resources to society. It will also need to work in support of government policies to create circular economies, or regenerative and nature-based solutions.

Earlier work on the matter in 2012 was developed by the Organisation for Economic Co-operation and Development (OECD), World Bank and UN in a report for G20 members on the types of measures that green structural reforms should include. Examples are:

- *Reforms of the structure of taxes and charges and environmentally harmful subsidies*, with due attention to the pricing of negative environmental externalities such as polluting emissions and the inefficient use of scarce natural resources.
- *Reforms that improve the working of product markets*, as price signals need well-functioning markets in order to provide incentives for reducing such externalities and to spur innovation and investment in cleaner activities.
- *Other policies, such as regulations and standards*, and other approaches to address information failures, measurement issues and behavioural biases to complement price-based instruments. Putting a price on externalities is an important element, but that alone will not be sufficient because under certain conditions pricing will be difficult to implement or the price signal may be weak.
- *Conditions for assuring the right policy framework for greening infrastructure provision*. An appropriate mix of market and non-market instruments is especially important in the network infrastructure sectors, which are critical for delivering green growth and sustainable development.
- *Innovation policies*, as technological progress is a key lever for fostering green growth and sustainable development. In this context, the rapid diffusion of green goods, services and technologies worldwide will be particularly important. Therefore, there is a crucial role for trade and international investment policies.
- *Broader social policies*, to better harness the synergies and minimise the possible trade-offs between social, economic and environmental objectives, including reviewing labour market policies that can facilitate the transition to a greener and more inclusive economic structure.

A key message from the OECD/World Bank/UN report was that green structural reforms that promote efficient markets for environmental services should not be seen as an adjunct to structural reform, but rather as long-term structural reforms that provide for superior outcomes for both growth and the environment. This 2022 edition of the AEPR will embody comparable advice for APEC but in the modern context where structural reform would be required as a response to the economic slowdown caused by COVID-19, and where action to combat climate change has become significantly more urgent.

GUIDE TO THE REPORT

The rest of the report proceeds as follows. Chapter 2 will provide an overview of green structural reforms in supporting recovery from economic shocks. Chapter 3 will outline the sustainability issues facing APEC. Chapter 4 will discuss key issues facing governments in implementing green structural reforms. Chapter 5 presents the core components of the reforms in improving the performance of the market and facilitating the allocation of resources to low-carbon activities in response to price signals, while Chapter 6 outlines the complementary enabling instruments. Chapter 7 concludes with key findings and recommendations as well as identifying areas for reference to the Economic Committee on further work.

2. STRUCTURAL REFORM AND RECOVERY FROM ECONOMIC SHOCKS

Wars and terrorist events, financial crises, natural disasters and pandemics can induce supply and/or demand shocks in the economy. They can turn into economic crises, defined as cumulative declines in consumption or GDP by at least 10 percent, if they are large, long-lasting and poorly managed. Governments, in responding to economic shocks, typically seek to limit the negative impacts by stabilising the economy and initiating rapid recovery. But response and recovery packages could also be used as a springboard for green structural reforms to build a more inclusive and sustainable economy (OECD 2009a).

The rest of this chapter discusses economic shocks and their impacts, and how recovery measures could be used to accelerate the movement toward a green economy.

ECONOMIC SHOCKS

Economic shocks have widespread, substantial and long-lasting effects on measures of economic performance, such as growth, unemployment, consumption and inflation. Because markets and industries are interconnected, large shocks can have repercussions throughout the economy, and in addition to their economic effects, have profound social and environmental impacts. International interconnectedness through trade and financial flows brings benefits to economies, but it also makes them vulnerable to economic shocks originating abroad. The term ‘contagion’ is used to describe how adverse events elsewhere reverberate across economies in a globally connected world.

Economic shocks could be categorised as supply shocks or demand shocks. Supply shocks make production more costly, and occur as a result of, for example, natural disasters, severe weather, wars or terrorism. Demand shocks suddenly reduce consumer spending or business investment, and occur as a result of, for example, a downturn in a major export market or a crash in asset values. The Individual Economy Reports (IERs) and case studies submitted by APEC members for this report cover a range of economic shocks including economic and financial crises, earthquakes and tsunamis, and adverse weather events.

Unlike most other shocks that affect either demand or supply, COVID-19 is simultaneously creating both supply and demand shocks. Lockdowns and quarantines reduce industrial activity, generating shortages of materials and industrial inputs, creating a supply shock that impacts global value chains ranging from electronics to cars and biopharmaceuticals. In turn, lost jobs and lockdowns reduce demand for services ranging from entertainment to retail and tourism, creating a demand shock that reaches back to reduced manufacturing.

Short-term responses to shocks, such as the USD 19.8 trillion spent by end of May 2021 alone on stimulus packages during the COVID-19 pandemic, can help to soften the immediate negative impact (Pigato, Rafaty and Kurle 2021). But shocks can reveal structural weaknesses that need to be addressed through fundamental changes to the economy. The aim of such changes is not only to recover from the shock, but also to drive long-term, enduring improvements in economic performance, improve social and environmental outcomes, and build resilience to better weather future shocks (OECD 2021c).

Economic shocks can turn into crises if they are large and long-lasting. Economies that start out in a stronger economic position, with sound institutions, stable inflation, manageable government debt, robust economic growth and reliable banks tend to weather shocks better.

Crises can provide an opportunity for structural reforms

Structural reforms are often initiated in response to economic crises. Crises can create pressure for governments to act and can reduce public resistance to change. Unsustainable economic conditions, and the fear that they could deteriorate further, serve as a catalyst for economic reform (Ranciire and Tornell 2016). The initial social, economic and environmental conditions in an economy, how well the shock is being managed (a well-managed shock may not turn into a crisis) and public perception of the need for change (not just the existence of a shock) affect the political decision to undertake reforms. But the crisis itself does not predict what form the response will take (Rodrik 1996).

Crises appear to be a significant factor in the push for structural reforms and its components (Lora 2000). Evidence of crisis-led reforms abound: Southern Europe in the wake of the Eurozone crisis; the trade reforms of Latin America in the 1980s and 1990s; or the French Revolution (Ranciire and Tornell 2016). However, there is also a contrasting view in the literature that the crises–reforms nexus is unfounded (Gokmen et al. 2021). Lessons for structural reforms from past crises are discussed in Appendix A.

STRUCTURAL REFORM

The primary objective of structural reforms has traditionally been to promote economic growth, for example, through improved competition, greater efficiency, and ultimately, through their influence on employment and productivity (Haraguchi and Weiss 2017).

However, measures promoting economic growth could be considered outdated if they do not take into account any economic or social challenges. Some economies are developing frameworks to support public institutions to consider the issues that matter to the population. For example, New Zealand’s Treasury has developed a Living Standards Framework that includes environmental amenities as among the factors to consider when providing policy advice.⁵

Structural reform provides the framework conditions for green recovery

Structural reforms contribute to removing barriers to the smooth and efficient functioning of product, capital and labour markets and can generate significant economic and employment gains, increase competitiveness, and encourage innovation at the same time as opening up opportunities for women and vulnerable communities (Hernando and San Andres 2015).

Structural reform policies also explicitly recognise that governments may pursue other policy objectives, such as economic inclusion, environmental protection, or better health and safety outcomes. And, structural reform policies seek to allow governments to achieve such objectives

⁵ The Living Standards Framework defines the environmental amenity domain as people having access to and benefiting from a quality natural and built environment, including clean air and water, green space, forests and parks, wild fish and game stocks, recreational facilities and transport networks (Treasury 2021).

either in tandem with or through the improved functioning of markets (Furman 2014; OECD 2016; Reed 2013; Stiglitz 2012).

Structural reform policies can provide the framework conditions for promoting green growth (OECD, World Bank and UN 2012). Well-functioning capital, labour and product markets can facilitate the efficacious functioning of market-based environmental policy instruments through their impacts on supply and demand (Marin and Mazzanti 2021) and can facilitate the reallocation of resources to sustainable, low-carbon activities (Adalet McGowan, Andrews and Millot 2017; OECD 2017b).

GREEN STRUCTURAL REFORMS AND ECONOMIC SHOCKS

The immediate response to shocks is often fiscal stimulus

The immediate government policy response to shocks is typically to deal with the crisis and save lives and livelihoods. Another key priority is to minimise the negative impact on the economy by supporting firms and employment and sustaining demand (OECD 2020a).

Fiscal stimulus spending can be used on green initiatives, and there is strong evidence that green stimulus policies are economically advantageous when compared with traditional fiscal stimulus (Allan et al. 2020). However, evidence from the global financial crisis of 2008–2009 and the COVID-19 pandemic shows that the proportion of fiscal stimulus spending on green initiatives is fairly small, and that most of the stimulus packages focus on business-as-usual activities.

Economies have mobilised unprecedented funding to tackle and recover from COVID-19

The Asian Development Bank (ADB) COVID-19 Policy Database estimates the total amount of spending by ADB members to combat COVID-19 as USD 31.735 trillion by November 2021 (ADB 2022). The objectives of fiscal policy actions adopted by governments in response to the COVID-19 pandemic fall into three broad groups: (1) to deal with the health impacts; (2) to support households; and (3) to bolster businesses. Governments pursue these objectives by using the whole range of fiscal instruments, including tax and expenditure measures, credits and guarantees (Lacey, Massad and Utz 2021).

There are numerous databases of fiscal stimulus measures by economy and assessments of the greenness of COVID-19 fiscal policies (see, e.g., Carbon Brief 2020; Engel et al. 2020; Hughes 2020; IMF, n.d.; O’Callaghan et al. 2021; O’Callaghan and Murdock 2021; OECD, n.d.; Pigato, Rafaty and Kurle 2021; UNDP Data Futures Platform 2021). By May 2021, at least USD 16.85 trillion of fiscal stimulus had been provided by governments. About 85 percent of total global spending during the COVID-19 pandemic was aimed at rescuing the economy (see Figure 2.1).

Assessments of the greenness of fiscal stimulus measures show that green considerations and recovery plans were not incorporated into the design of stimulus packages, and that economies have preferred shorter-term, business-as-usual support, including for environmentally damaging industries or investments in current or traditional infrastructure. (Aylward-Mills et al. 2021; O’Callaghan et al. 2021; Smith and González 2021; Vivid Economics 2021). Most stimulus spending has focused on rescue measures rather than on long-term economic recovery and has been broadly blind to green considerations, or, as characterised by Pigato, Rafaty and

Kurle (2021), overwhelmingly ‘light brown’ (78.2 percent) and ‘brown’ (4.4 percent) (refer to Figure 2.1; see also Larsen et al. 2021).

Box 2.1 Plans to promote economic recovery

Chile’s Presidential Step-by-Step Plan focused on supporting the displaced workforce and small and medium enterprises (SMEs) affected by the COVID-19 pandemic. It contributed USD 4.5 billion to the wider Public Investment Plan for 2020/2021, investing in public projects (2,544) with capacity to create 250,000 additional jobs. These investments were targeted toward strengthening infrastructure, social need and quality of life, and productivity.

Thirty percent of the investments contributed directly toward sustainability, including water source resilience and irrigation efficiency; extension of public transport and cycle path; thermal conditioning and energy efficiency in homes; planting of suitable trees; and improvements in waste management.

In 2022, an Inclusive Recovery Plan was launched with the intention of supporting vulnerable groups who have been struggling with the economic crisis, by recovering wage earners’ jobs, tackling rising living costs, boosting SMEs and public investment, and providing economic and social protection mechanisms. Within this framework, green measures are being considered, such as the transition to low-carbón electricity systems and the establishment of quality standards for biofuels, which could reduce greenhouse gas emissions by five times.

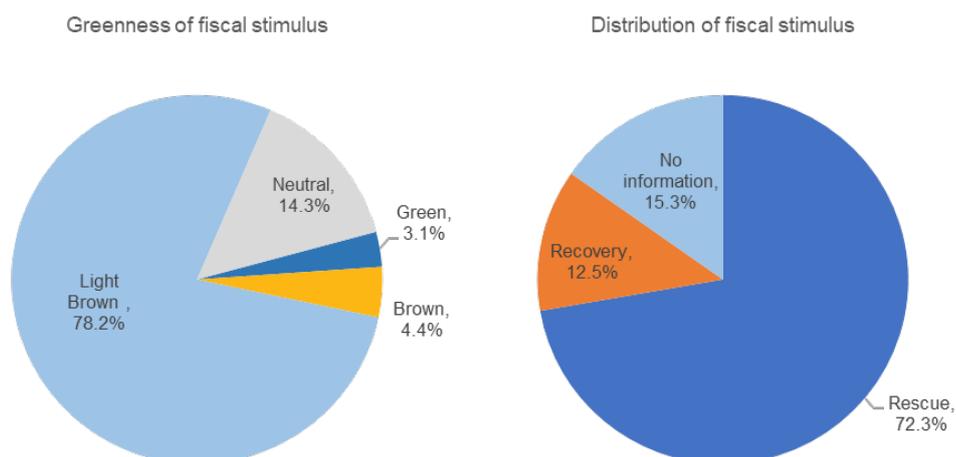
In China, to alleviate the impact of the pandemic on the economy, the government introduced a comprehensive set of measures to boost the real economy. For example, in 2020, the Chinese government issued one trillion-yuan worth of special anti-pandemic treasury bonds, and cut the tax and levy burden on enterprises by more than 2.6 trillion yuan throughout that year. In 2021, the government established a mechanism of regular transfer of direct fiscal funds. 2.8 trillion yuan were transferred, which guaranteed full coverage of the central government’s livelihood subsidies. In 2022, the national general public budget expenditure is expected to increase by more than 2 trillion yuan compared with 2021, and transfer payments from the central to local governments will expand by roughly 1.5 trillion yuan.

In addition, China has implemented relevant science-based measures to achieve stable economic growth, maintain stable employment, and meet energy conservation and emission reduction targets. For example, the reduction in interest rates and reserve rate requirements; the maintenance of stable supply and prices concerning key products; the support of entrepreneurship and innovation to drive large-scale employment; and the acceleration of green transformation by expanding green investments and developing carbon market trading. Moreover, China also put in place science-based and targeted measures in epidemic prevention and control, such as the use of digital technology to speed up the resumption of work, school and production, as well as to implement pandemic prevention and control.

Regarding MSMEs, China has increased its support for MSMEs struggling with difficulties during the pandemic. The government reduced the financing costs of MSMEs by lowering down the banks’ required reserve ratio and offering medium-term lending facility loans, among others. Financial support to companies affected by COVID-19 through interest subsidies, guaranteed start-up loans and reduced guarantee (and re-guarantee) fee rates. A portion of micro and small businesses in the service industry has obtained temporary rent concessions. Furthermore, China has taken various measures to support MSMEs’ innovative development. The government implemented the Action Plan for Digital Transformation Partnership and the Special Action for Digital Empowerment of SMEs to promote the research and development of key technologies and products for digital transformation, and to establish a cross-industry digital ecosystem that integrates the upstream and downstream of the industrial chain. Finally, the government has created a more favourable environment for MSMEs by eliminating obstacles that hinder market competition.

Source: Individual Economy Report (IER) from Chile. IER and case study from China, 2022.

Figure 2.1 Fiscal stimulus measures worldwide



Note: ‘Light brown’ stimulus in the context of COVID-19 recovery refers to spending that supports the economy with wage and employment subsidies, value-added tax (VAT) reductions, and liquidity injections for businesses without any green conditions attached, keeping alive economic activities that otherwise would have stopped or been reduced in absence of these policies. Given most economies rely heavily on fossil fuels, this type of stimulus increases emissions, although it is not intentionally aimed at doing so. ‘Brown’ stimulus refers to new investments and activities with large associated greenhouse gas emissions (compared to a situation in which they would not have taken place), such as coal mines, oil infrastructure and traditional transport infrastructure.

Source: Pigato, Rafaty and Kurle. (2021).

The COVID-19 pandemic is not the first time fiscal stimulus has been used to recover from an economic shock. Analysis of the stimulus packages during the 2008–2009 global financial crisis suggests that short-term response measures need to be combined with longer term structural reforms to bake in the impact of the stimulus and bring about lasting change (see Appendix B; OECD 2020d). For example, the clean energy investment component of the 2009 American Recovery and Reinvestment Act contributed to the subsequent significant growth in clean energy in the US (see Box 2.2).

Box 2.2 American Recovery and Reinvestment Act 2009

The American Recovery and Reinvestment Act 2009 was a fiscal stimulus measure to deal with the global financial crisis of 2008–2009. Its immediate goal was to stabilise the economy, preserve and restore jobs, and assist deeply suffering industries.

The Act consisted of USD 787 billion in spending (later raised to USD 831 billion) in tax cuts/credits and unemployment benefits for families. It also earmarked expenditures for healthcare, infrastructure and education. Of the initial allocations, USD 90 billion, or about 11 percent, was allocated toward investing in a cleaner, more sustainable energy future. The clean energy-related funding made up roughly one-eighth of the total, representing a substantial direct boost.

The Act focused on four major categories of energy-related investments: energy efficiency, the electric grid, transportation and clean energy. These investments addressed multiple market failures, such as environmental externalities and innovation market failures. Major targets included about USD 25 billion to promote renewable electricity generation through investment grants, production tax credits and loan guarantees. Another USD 20 billion funded energy efficiency and conservation through tax credits, rebates and block grants to state and local governments. The funding reached nearly every aspect of the value chain for numerous key clean energy technologies, including advanced vehicles, batteries, carbon capture and sequestration, and technologies to enhance energy efficiency.

The clean energy policies in the Act laid the foundation for a long-term transition to a cleaner economy by improving clean energy markets, unlocking private capital, helping drive down clean energy technology costs, and expanding research and development of new technologies. They led to the growth in clean energy in the US that occurred between 2009 and 2016. Solar electricity generation increased over 30-fold and wind generation increased over threefold from 2008.

A key element of the clean energy-related investments is that while they were designed to provide long-term benefits, the allocations focused as much as possible on projects that were ‘shovel-ready’ and could be deployed relatively quickly, in order to take advantage of resources in the economy that were under-utilised due to the global financial crisis. In short, the allocations aimed to put people back to work and contributed to both the recovery and reinvestment goals of the legislation.

Source: Case study from the US, 2022.

...but stimulus needs to be backed by green structural reforms

Transient fiscal stimulus packages must be accompanied by structural reforms in order to lock in the long-term benefits of the investment and make the gains enduring and successful (see Appendix B; Gawel and Lehmann 2020; PRI 2020). Green recovery programmes should be integral to creating a green transition and making economies more resilient (ADB 2020; Aylward-Mills et al. 2021; Buckle et al. 2020; Burger, Kristof and Matthey 2020; González et al. 2021; Hughes 2020; Lim, Ng and Zara 2021; OECD 2021d; Smith and González 2021; Whitley et al. 2018).

Just as structural reforms promote efficiency by creating well-functioning markets to ensure resources are used where they are valued most highly, green structural reforms involve measures to promote the efficient use of natural resources and shift investment and decision-making to green activities by:

- attaching an *explicit price* to environmental goods and services through taxes or cap-and-trade systems; removing environmentally harmful subsidies; and subsidising green activities and investments (e.g., implementing emissions taxes, removing agricultural subsidies for fertilisers or pesticides, providing subsidies for electric vehicles)

- imposing an *implicit price* on environmental goods and services through direct regulation (e.g., introducing bans to distribute certain types plastic bags in shops, or establishing environmental product standards).

Green structural reforms are complemented by enabling policies, such as information provision, support for innovative green technology, capability building, public procurement and international cooperation, which are discussed further in Chapter 6 (OECD 2017a; 2017c).

...that are integral to the structural reform agenda

Green structural reforms should be seen as integral to overall structural reform policies that aim to promote economic growth and foster sustainable, low-emission and socially inclusive development through removing barriers, such as distorted pricing, to well-functioning markets (OECD 2011a; World Bank 2012).

Integrating economic, environmental and social objectives in structural reforms brings challenges, and policymakers need to take care that green growth and environmental sustainability are not achieved at the expense of greater equity, poverty alleviation and other priorities such as food security. At the same time, governments need to ensure that measures to tackle shocks do not undermine their efforts to address pressing environmental challenges (OECD 2020d).

The four pillars of structural reform – sound public sector governance; competitive products and services markets; flexible labour markets; good regulatory policy – are critical to the effective implementation of green structural reforms, because residual distortions or underperformance in these areas can undermine their effectiveness and thwart the achievement of environmental objectives.

- *Sound public sector governance* is fundamental to the design, implementation and enforcement of green policies.
- *Competitive product and services markets* are important to foster innovation and remove barriers to entry, particularly for small, innovative firms.
- *Flexible labour markets* provide people with the ability to move to sectors and firms where their skills are more valued.
- *Good regulatory policy* ensures that regulation is enabling, performance-based, coherent and adaptive and does not hamper the use of new green technologies and processes.

Green structural reforms can contribute directly to economic growth and inclusion

Policymakers have often assumed that there are tensions between the achievement of environmental objectives and other objectives such as improved economic growth and inclusion. Increasingly these assumptions are being questioned as positive synergies between these objectives are uncovered. An understanding of such synergies is particularly important as economies look to use green structural reforms to recover from economic shocks.

For example, emissions taxes and the removal of environmentally harmful subsidies could provide governments with fiscal headroom for initiatives such as increasing green investments or incentivising green activities. Green policies could stimulate private sector innovation through regulation or public procurement that drives demand for new green products and services. Trade in green technologies could spur international diffusion and export growth.

Green investments such as renewable energy, low-emissions transport, energy efficiency and nature-based mitigation and adaptation solutions could provide higher employment intensity, better financial and economic returns and wider social benefits than policies that seek to prop up archaic, polluting means of production (Aylward-Mills et al. 2021). For example, Batini et al. (2021), in estimating multipliers for renewable versus fossil fuel energy investments, find that the difference in the two multipliers is non-zero, with very high probability in favour of renewables. Korea's Green New Deal stimulus package (see Box 6.9) includes investments in advanced green technologies to create jobs; expansion of solar panels and wind turbines; as well as investments in smart grids and microgrid communities.

Recent analyses suggest that implementing green strategies for pandemic recovery along with ambitious climate policies can have positive short-run and long-term effects in terms of jobs, poverty reduction, GDP growth, and social and equity goals (Hepburn et al. 2020).

Green policies can increase resilience (the ability of a system to deal effectively with change) to future environmental shocks (such as natural disasters) or economic shocks (such as spikes in commodity prices) (Schultz 1975). Green policies aimed at building resilience in land, water and biodiversity could ensure that the resources are plentiful when they are most needed, such as in response to shocks, thereby reducing natural-resource price volatility and bottlenecks, and allowing the system to recover.

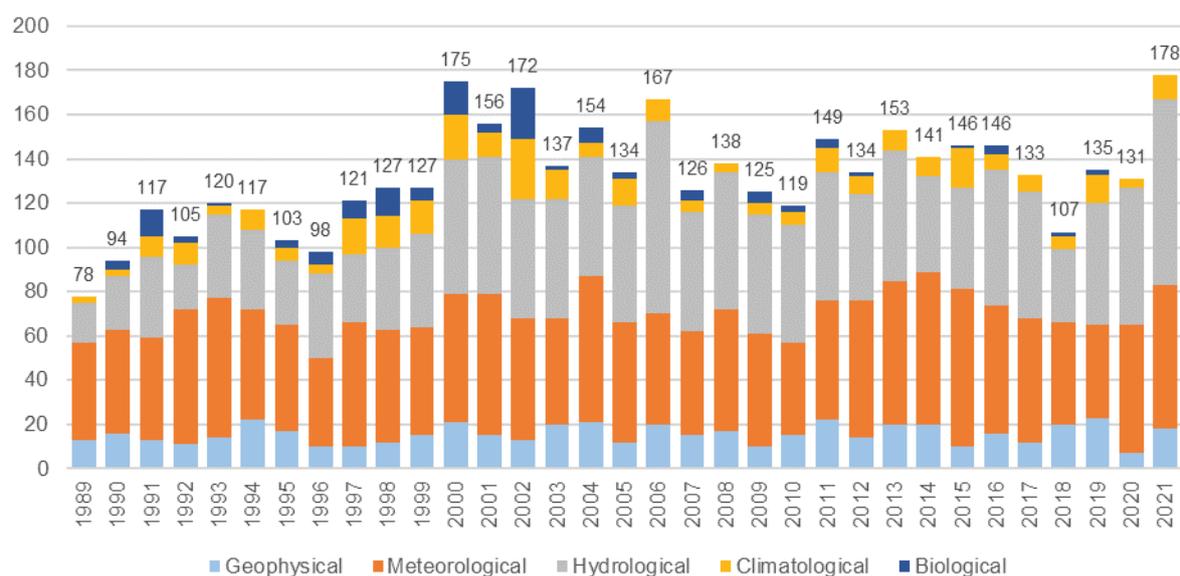
3. SUSTAINABILITY ISSUES FACING APEC

In assessing the role of structural reform in promoting a green recovery from current and future economic shocks, it is important to outline the types of sustainability challenges faced by APEC member economies. APEC economies (and the region itself) are particularly exposed to such challenges given their geographic diversity and geographical locations (APEC PSU 2021; World Bank 2020a; see Figure 3.1).

Coastal zones are particularly threatened by the risk of rising sea temperatures and levels that will cause permanent submergence of land, more frequent or intense coastal flooding, more coastal erosion, loss and change of coastal ecosystems, salinisation of soils, ground, and surface water, and impeded drainage (causing surface flooding) (Oppenheimer et al. 2019).

The APEC region is prone to experiencing natural disasters, and cumulatively disaster-related losses for APEC economies is estimated to be around USD 111 billion annually (APEC 2021c). Successful management of environmental issues is therefore a priority for APEC while still ensuring there are opportunities for economic growth and development in member economies (APEC 2015).

Figure 3.1 Number of natural disasters in the APEC region, 1989–2021



Source: Emergency Event Database (EM-DAT), accessed 2 August 2022, <https://www.emdat.be/>; APEC Policy Support Unit (PSU) calculations.

This chapter outlines some of the major environmental issues facing APEC economies, from climate change, to waste and pollution, deforestation, public health issues, natural resource depletion, and energy systems and resiliency. It also introduces the range of examples of structural reforms to respond to economic shocks provided in the Individual Economy Reports (IERs) and case studies submitted by APEC member economies.

CLIMATE CHANGE

Climate change is one of the biggest environmental issues that APEC economies face because of increasing emissions activity over time. As shown in Figure 3.2, which is based on analysis by the APEC Policy Support Unit, global greenhouse gas (GHG) emissions have been steadily increasing since 1990 and APEC economies are driving that growth (APEC PSU 2021).

Energy generation is the main source of carbon dioxide (CO₂) in the APEC region (APEC Economic Committee 2022). It accounts for 40 percent of emissions, driven by a heavy reliance on coal-based electricity (60 percent of the region's energy mix).

Manufacturing plays an important role in economic growth in the APEC region, and manufactured goods represent the largest share of APEC's intra-regional and inter-regional trade (APEC PSU 2019). Intra-APEC trade in manufactured goods has been increasing 6 percent annually since 1996 and represented around USD 5.6 trillion in 2021 (WITS 2022). These increases in manufacturing activity likely contribute to the increase in GHG emissions from the APEC region.

Agricultural activity is another significant source of emissions globally (Lynch et al. 2021). Agricultural activity generates non- CO₂ emissions through crop and livestock activities as well as CO₂ emissions through conversion of natural ecosystems (such as forest and peatlands) for agricultural land use (FAO 2020). Livestock are responsible for roughly 32 percent of human-caused methane emissions (UNEP 2021) and 14.5 percent of total global GHG emissions (Quinton 2019). Population growth, economic development and urban migration are further driving demand for animal protein (UNEP 2021), with demand for beef products in Asia alone expected to increase by 300 percent by 2050 (Quinton 2019).

Such numbers and trends make agricultural activities prime candidates for focused mitigation technologies and policies in the battle against climate change. For example, there is an array of work being done to identify low-methane traits in livestock for future selective breeding (e.g., Kittlemann et al. 2014; Negussie et al. 2017; Roehe et al. 2016) as well as methane reduction by adding additives or supplements to livestock feed (Department of Primary Industries and Regional Development 2022). In addition, conservation agriculture, which includes reduced or no-till practices along with crop residue retention and mixed crop rotations, offers multiple benefits for soil health and reducing GHG emissions (Somasundaram et al. 2020).

Figure 3.2 shows further that APEC economies collectively produce more CO₂ and GHG emissions than the rest of the world, particularly when considering the population and GDP of the two groups (APEC PSU 2021).

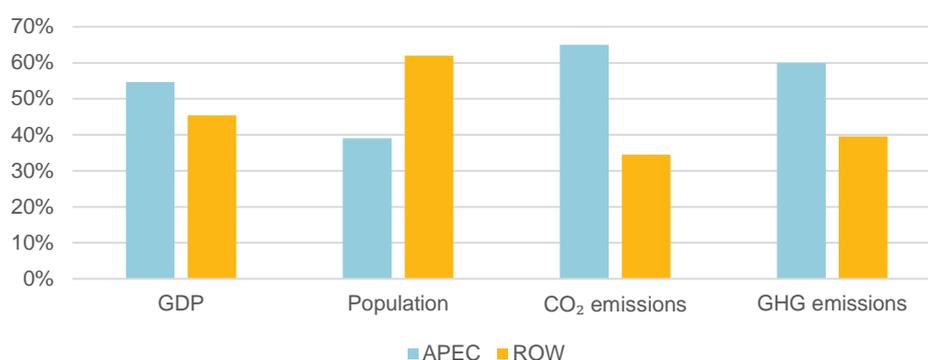
Emissions are a key contributor to climate change. There are many flow-on effects from climate change, particularly for APEC economies given their vulnerabilities to climate events (World Bank 2020a), including:

- *More extreme weather events*, which APEC economies are particularly exposed to, given their geographic locations and geographic diversity.
- *Impacts on economic activity*, as a result of environmental changes such as sea level rise, precipitation increases (and increased flooding) and drought. This could cause

lower agricultural yields and food insecurity in vulnerable regions, and poverty because of food price increases when there are bad yields⁶.

- *Migration* (both internal and international), as people move away from areas more susceptible to climate events (Hauer, Evans and Mishra 2016). Population decreases could have productivity and wealth implications for the area.
- *Potential for economic shocks* that could fuel conflict in economies with fragile social and political systems (Brück and d’Errico 2019; Mach et al. 2019).
- *Economic inequality* within and between economies, since lower income groups are typically more exposed to the adverse effects of climate change, more susceptible to the damage caused by climate change, and less able to cope and recover from climate change induced damages (Islam and Winkel 2017).
- *Severe impact on biodiversity and complex ecosystems*, which is likely to pose additional negative risks to economic activity (Newbold 2018).
- *Health impacts* through air pollution, changes in extreme temperatures, mortality through flooding, and disease.

Figure 3.2 APEC CO₂ and GHG emissions, 2018



CO₂=carbon dioxide; GDP=gross domestic product; GHG=greenhouse gas
Source: APEC PSU (2021).

WASTE AND POLLUTION (AIR, WATER AND SOIL)

Waste and pollution, including plastic pollution, are big environmental threats to the APEC economies. Land-based waste mismanagement leads to debris entering the ocean. Global plastic production has increased to 322 million tonnes annually (APEC Oceans and Fisheries Working Group 2020).

Marine waste pollution is problematic for APEC economies. The marine economy in the APEC region amounts to USD 2.06 trillion, or 4.7 percent of APEC GDP (APEC Oceans and Fisheries Working Group 2020). Marine pollution affects economic and food security by damaging the coastal ecosystem; the tourism industry also suffer economic losses from tourists who choose to spend their vacations away from polluted marine environments. Marine pollution is estimated to cost APEC economies USD 10.8 billion annually (APEC Oceans and Fisheries Working Group 2020).

⁶ As different crops will react differently to the effects of climate change, nutrition could also be impacted.

Soil pollution is another environmental impact of certain economic activities that will continue to pose as an issue for APEC members. There are many sources of soil pollution, including:

- Misuse of heavy metals, excessive use of fertilisers, and pesticides used in agriculture, which can cause soil pollution and damage surrounding ecosystems, including the health of people.
- Poorly managed waste disposal from both municipal and industrial sources that contaminates the soil.

Soil pollution reduces the soil's capacity to act as a filter, resulting in further pollution of water bodies (which has negative health impacts for humans and ecosystems). It leads to biodiversity loss, overuse of water resources, loss of soil fertility and quality, air pollution and the inability of the ground to drain properly which can cause floods (EEA 2021a; FAO 2018b).

Air pollution similarly is a product of economic activities such as manufacturing and transportation. Air pollutants are generated from mostly the same sources as GHG emissions (Gao et al. 2018). In addition to the impact of air pollution on climate change, there are also a range of health impacts such as cardiovascular and respiratory diseases that are caused and exacerbated by higher levels of air pollutants (Manisalidis et al. 2020). Additionally, higher air pollutant levels also affect the geographical distribution of infectious diseases (Manisalidis et al. 2020).

DEFORESTATION AND FOREST DEGRADATION

Deforestation refers to the permanent removal of forest area, typically to use the land for other productive purposes. Forest degradation refers broadly to a reduction in the ability of a forest to produce ecosystem services such as carbon storage and wood products as a result of anthropogenic and environmental changes (Thompson et al. 2013). This has impacts on carbon sequestration (and climate change upon release of CO₂), soil erosion, and flooding, among others (Domroes 1991). The key drivers of deforestation and forest degradation in APEC economies (APFNet and FAO 2015; Lin et al. 2019) and elsewhere (Houghton 2012; Kissinger et al. 2012; Rudel et al. 2009; Weatherley-Singh and Gupta 2015) are recognised as:

- *Agricultural expansion.* In 2012, commercial and subsistence agriculture were the direct drivers of more than 70 percent of deforestation in developing economies (Hosonuma et al. 2012).
- *Forest product extraction.* Logging and fuelwood are major direct drivers of forest degradation (Hosonuma et al. 2012).
- *Infrastructure development.*
- *Biophysical factors,* such as climate and weather events, forest fires, and pests and diseases may result in temporary, and in some cases, permanent forest loss (APFNet and FAO 2015).

Indirectly, poverty, population increases, wood product demand, governance factors, urbanisation and urban sprawl, and a lack of coherent cross-sectoral policies are also drivers of deforestation in APEC economies (APFNet and FAO 2015). As such, areas with lower income, higher poverty, and higher population and economic growth may see more deforestation, and/or at quicker rates.

It was expected leading up to the review of the APEC Forest Cover Goal in 2020 that forest area would increase in East Asia, the Americas, Russia and the Pacific, but decline in Southeast

Asia. The review in fact found that forest areas increased in nine APEC economies and decreased in 10 while the goal overall was achieved and the region in total increased forest cover by 27.9 million hectares between 2007 and 2020 (APEC SOM Steering Committee on Economic and Technical Cooperation 2021).

PUBLIC HEALTH ISSUES

Public health issues are threats to the APEC region because of their potential to significantly impact the welfare of society as well as the economy, trade and security.

APEC member economies recognise that there needs to be cooperative and ongoing engagement to manage the development and spread of contagious diseases (such as COVID-19); aging populations and the growing complexity of care required; spiking non-communicable disease rates and more complex disease management requirements for people; and natural disasters due to climate change (APEC 2014).

Rising temperatures and therefore exposure to extreme heat

Rising temperatures pose a public health risk (Romanello et al. 2021). Exposure to extreme temperatures is an acute health hazard, with people over 65 years old, living in urban areas, and/or with health conditions being most at risk (Basu and Samet 2002; Kovats and Hajat 2008; Li et al. 2015). Risks to health because of extreme temperatures are further intensified by low availability of cooling mechanisms and urban greenspace (Romanello et al. 2021). Populations in economies with low and medium scores in the UN-defined human development index (HDI) have seen the biggest increases in heat vulnerability in the past 30 years (Romanello et al. 2021).

Rising temperatures also have impacts on productivity and the economy. In 2020, 295 billion potential work hours were lost due to heat (Flouris et al. 2018; Romanello et al. 2021), half of which fell on agricultural workers in economies with low and medium HDI.

Increased disease transmission

Environmental conditions are increasingly favourable to the transmission of many water-, air-, food- and vector-borne pathogens (Caminade, McIntyre and Jones 2019; Romanello et al. 2021; Semenza et al. 2012). For example, dengue virus infections are driven majorly by climate change, along with global mobility and urbanisation (Iwamura, Guzman-Holst and Murray 2020; Vos et al. 2020). Other diseases influenced by changing environmental conditions include malaria, vibrio pathogens and mosquito-borne diseases (Romanello et al. 2021).

Environmental stresses linked to mental health

The connection between planetary and human health also extends to mental health. Increasing rates of climate-related hazards are intensifying existing mental health problems, leading to psychological distress, and contributing to onset of new episodes of mental illness (Beaglehole et al. 2018). Climate change and climate-related hazards can cause human (im)mobility, social tensions and conflict, and livelihood loss and economic hardship – all of which have impacts on mental health (Hayward and Ayebe-Karlsson 2021; Kelman et al. 2021; Royal College of Psychiatrists 2021).

Extreme weather events and natural disaster leading to mortality

There has been a statistically significant increase in the number of extreme weather events in the past 30 years (Romanello et al. 2021). However, only the low HDI group of economies saw a statistically significant increase in the number of people affected by these events. The extreme weather events include:

- *Wildfires*. Sixty percent of economies had an increase in the number of days people were exposed to very high or extreme fire danger in 2017–2020 compared with 2001–2004 (Romanello et al. 2021). Seventy-two percent of economies had increased human exposure to wildfires across the same period (Romanello et al. 2021).
- *Flooding*. Climate change is expected to increase the burden of mortality from coastal flooding and increase storm surge-associated mortality in many regions of the world, in particular south Asia, North America, Oceania, and east and west sub-Saharan Africa (WHO 2014).

Food security and undernutrition

Food security, and sustainability of supply of nourishing foods, is an increasing concern as the climate changes. Increases in average sea surface temperatures globally represent a growing threat to marine food productivity and security, particularly for coastal tropical economies (Allison et al. 2009; FAO 2018a; Lynn et al. 2014; Romanello et al. 2021). In terms of land crops, rising temperatures are shortening the time taken for crops to reach maturity and therefore reducing crop growth and seed yield potential (Craufurd and Wheeler 2009). Climate change is also increasing the frequency, intensity and duration of drought events, which has an impact on crop yields (Romanello et al. 2021).

Causes of undernutrition are complex and extend beyond food availability alone, and include factors such as poverty, access to services, social conditions and underlying population health (WHO 2014). Nevertheless, climate change is expected to cause a significant increase in the number of children with severe stunting, regardless of socioeconomic scenario (WHO 2014). Some of this may be driven by reduced average food yields and crop productivity.

NATURAL RESOURCE DEPLETION

Around 70 percent of all mining output is produced and consumed in the APEC economies (APEC 2022). Resource extraction provides a growth opportunity for some remote areas in the APEC region. However, unsustainable management of resources can undermine any long-term benefits to be gained from resource extraction (APEC PSU 2018).

Resource extraction and processing always has an impact on the environment, causing soil degradation, water shortages, biodiversity loss, and damage to ecosystem functions, and exacerbating global warming (Zinsius 2019). The issue is therefore how to maximise the effective output of natural resources while managing the resources and the environment sustainably for long-term use and benefit. This requires innovation and the development of new technology, as well as effective management practices.

It is necessary to improve access to, and sustainable management of, natural resources to provide ample opportunities for the local economy and to benefit the poor (and the remote areas of APEC that rely on resource extraction most for growth) (Lee et al. 2009).

ENERGY SECURITY

The resilience of energy systems in the APEC economies has significant climate change implications. APEC economies make up 60 percent of world energy demand and the APEC region has four of the world's five largest energy users (China; Japan; Russia; the US) (APEC 2021e). Additionally, over 80 percent of the region's primary energy demand in 2050 is expected to be met by fossil fuels if APEC economies were to continue with a business-as-usual approach (APEC 2021e). Since fossil fuel usage directly contributes to emissions output, this would make it nearly impossible to meet the Paris Agreement aspirations of limiting global temperature rise to below 2°C, let alone meet the 1.5°C target. Significant action will be needed from all APEC economies if there is to be a global transition to net zero economies by around mid-century in order to avoid the worst impacts of climate change.

Other environmental effects because of climate change, such as droughts affecting hydroelectric power generation, have impacts on energy supply and security, which can flow on to have economic impacts for APEC economies, particularly given the region's high share of energy demand. There are well-studied risks to traditional energy supplies (e.g., oil), such as the main concentration of source in the Middle East where there are geopolitical risks, potential for price fluctuations and sea commerce reliance (APEC Energy Working Group 2019). At the same time, the movement to renewable energies (e.g., hydro, solar and wind electricity) means an inherent reliance on the climate, and therefore as the climate changes and there are more extreme weather events (such as droughts and other natural disasters), economies face greater exposure to volatility in energy production (Solaun and Cerdá 2019). This may flow on to volatility in energy prices and have impacts on productivity and energy poverty.

Noting these challenges on the need of securing a cleaner mix of energy sources to avoid global temperature rise to reach unsustainable levels, an option for reducing CO₂ emissions and gradually transiting toward a net zero situation is for some economies is to consider the use of natural gas⁷ and/or nuclear, and for all economies to allocate resources to develop and enhance the use of low-carbon sources of energy, such as renewables and hydrogen.

STRUCTURAL REFORM IN APEC ECONOMIES TO TACKLE SUSTAINABILITY CHALLENGES

Individual Economy Reports and case studies provide examples of recovery measures

20 APEC economies submitted IERs with examples of recovery measures that they have taken to address economic shocks, including financial shocks, natural disasters, climate change and COVID-19. Case studies from 10 economies provided more in-depth information. Boxes throughout this report are mostly drawn from the IERs and case studies submitted as of May 2022 to illustrate the types of policy measures available for recovery from economic shocks.

Not all recovery packages are designed primarily to deliver environmental benefits (Aguilar Jaber et al. 2020; Maas and Lucas 2021). Some, such as fiscal stimulus packages, are typically directed at socioeconomic recovery and only incidentally generate green co-benefits.

⁷ Natural gas combustion produces at least 25 percent less CO₂ than that from oil derivatives such as gasoline and diesel (US Energy Information Administration, 2022).

Economies have mobilised unprecedented funding to tackle and recover from the COVID-19 crisis. Most stimulus measures have not been aimed at improving environmental outcomes; however, socioeconomic stimulus measures can create green co-benefits even if they are not the primary objective.

For example, in New Zealand, responses to the economic crisis of the early 1980s included a wide range of reforms to liberalise the economy. Among the reforms, agricultural subsidies were eliminated, income tax rates reduced, and controls on wages, prices, interest rates and foreign exchange lifted. Although environmental sustainability was not the intention of the removal of inefficient agricultural subsidies, there were environmental benefits in terms of reductions in animal numbers and the area of pasture, increases in the area of planted forest, reduced erosion, and decreased contamination of rural waterways (see Box 5.2).

In this sense, policy packages to recover from economic shocks can include a range of policies aimed at generating environmental benefits and improving sustainability alongside an economic recovery agenda (Aguilar Jaber et al. 2020; Maas and Lucas 2021). These can include green structural reforms such as carbon pricing to improve the functioning of environmental markets as well as complementary policies such as investment in innovation.

Some APEC economies are already implementing green structural reforms and complementary policies. For instance, Canada has implemented carbon pricing (see Box 4.1). In Chile, a carbon tax, a tax for local pollutants, and a tax for new vehicles were introduced in 2017 (see Box 5.1). Russia is piloting a cap-and-trade system in the Sakhalin region (see Box 5.3). Complementary measures include innovation and technology policies, such as Australia's 'Powering Australia', with its focus on renewable energy (see Box 6.2), green public procurement in a number of economies, including Thailand (see Box 6.3), and green finance.

As economies emerge from COVID-19 lockdowns and plan their recovery, attention has turned to addressing the climate crisis and building resilience (Shearing 2021). Since the outbreak of the pandemic, a number of APEC member economies have developed and published strategies and plans for green recovery from economic shocks. The strategies reflect the circumstances in each economy, including its environmental challenges and its overall goals of economic adaptation or transformation. Several strategies reflect long-term commitment to the green transformation of their economies as a response to economic shocks (ADB 2020; Aguilar Jaber et al. 2020; Barbier 2020a; Lim, Ng and Zara 2021; Maas and Lucas 2021).

For example, Korea's New Deal 2.0 is aimed at carbon neutrality and accelerating the transition to a low-carbon and eco-friendly economy by accelerating digital and green energy transitions (see Box 6.9). The Brunei Economic Blueprint advances an economic diversification agenda, to move from being an economy highly dependent on oil and gas, which was negatively impacted during the pandemic, to one that is dynamic and sustainable (see Box 4.4). Japan's Green Growth Strategy is an industrial transformation agenda that reflects the view that responses to global warming and the goal of net zero GHG emissions by 2050 present an opportunity for economic growth, rather than being a constraint (see Box 4.5).

Green structural reforms are needed to promote sustainable outcomes

The previous discussion illustrates that APEC economies face a wide range of sustainability challenges. There is however little evidence from the IERs and case studies submitted that APEC economies have developed comprehensive structural reform strategies to tackle these challenges and promote a green recovery from economic shocks. Chapter 1 illustrated how

progress with structural reform per se in APEC has weakened in recent years. With a few notable exceptions, the IERs list few structural reform measures aimed at influencing prices and markets to promote sustainable outcomes. Rather they tend to concentrate on industry, investment and technology policies, as well as the introduction of hard rules, to promote sustainability. While such complementary enabling instruments (the subject of Chapter 6) are important elements of a strategy for a green recovery, their effectiveness will be limited without structural reform policies to deliver appropriate price signals and market flexibility.

Chapter 1 also argued that as APEC economies seek to recover from the economic setbacks caused by COVID-19, they have the opportunity to put the role of structural reform once again at the forefront, especially given the growing constraints on macroeconomic policies imposed by renewed inflation and limitations on government budgets. Chapters 4 and 5 of this report, therefore, are devoted to the types of institutions that will be required to use structural reform for a green recovery as well as the structural reform policies themselves. Examples from the IERs will be presented to illustrate the types of approaches that could be followed.

4. IMPLEMENTING GREEN STRUCTURAL REFORMS

As APEC economies seek to recover from economic shocks, there will clearly be opportunities to implement green structural reforms. But in instituting reforms, two factors interact to make policy choice and design a demanding challenge: the complexities of the economy and ecosystems, and the presence of profound uncertainties (Roelich and Giesekam 2019).

The rest of this chapter will discuss how governments may address the challenges of the physical and political environment and ensure policy coherence and effective public sector governance in implementing green structural reforms.

ENVIRONMENTAL COMPLEXITY AND UNCERTAINTY

The impacts of policy changes are hard to predict

Greenhouse gas (GHG) emissions and other environmental issues arise from a complex and interconnected economic system. The interactions within the economy make it difficult to predict the short- and long-term impact of behavioural responses to policy changes, on innovation and deployment of new technology, on emissions themselves, and on other aspects of the economy. Policies themselves can be complex because there can be multiple sources of market failure, requiring a mix of policy instruments applied to different parts of the economy and often implemented by different government agencies, so it can be hard to trace through their impacts. Predictions become even more uncertain when systemic change is envisaged that stretches out over decades (Altenburg and Rodrik 2017).

It can be difficult to fully understand the social and economic consequences of changes to ecosystems or the climate, or the options that will be available for addressing problems. The technical feasibility, applicability, and social acceptability of new technologies are often just beginning to emerge. The impact of innovative policy instruments is hard to foresee, and they can have unintended and unpredictable side-effects (Lütkenhorst et al. 2014). There is also uncertainty about social preferences and how to value trade-offs such as economic costs and the preservation of biodiversity. Political factors, such as the potential for new governments to change policies, also create uncertainty about the predictability and durability of policies. The long time frames required for policies to have an impact exacerbate these uncertainties.

At the same time, governments have an important role in reducing uncertainties and related investment risks for the private sector through establishing predictable and stable long-term policy frameworks. For example, Peru has been able to maintain a basic economic framework for several years despite recent political turmoil, in part because of the National Agreement, a policy coordination forum that involves the participation of the government, political parties, the private sector and civil society, and has expressed explicit consensus on the courses of public action that seem desirable for broad sectors and members of society, regardless of political values (Iguñiz 2015; Nepo-Linares and Velásquez 2016).

POLITICAL ECONOMY

Green structural reform packages need to be tailored to the specific circumstances and priorities of different economies

There are numerous policy instruments and paths that APEC economies could take to promote a green recovery. They usually combine market-based instruments, regulations, capacity building, subsidies and other components in various ways. The illustrative boxes in this report show the wide range of instruments used across APEC economies. The mix of policies and the breadth, depth and pace of structural change will reflect the nature of the economic shock and the environmental issues to be addressed, as well as each economy's specific circumstances, such as what degree of policy complexity can be handled, the incidence of the short- and long-term costs, and the benefits of the reforms and how well the government is insulated from lobbying pressure.

Certainly, there is no one-size-fits-all in terms of structural reforms. The structure of an economy, its patterns of investment and its relative dependence on certain sectors would likely play a role in the choice of feasible policy options. These are not the only factors that differentiate economies and their choice of green structural reform packages. While APEC economies face some common challenges such as climate change, they differ in their natural resource endowments, such as the potential for hydropower or solar energy, and environmental challenges and opportunities, which will affect their choice of strategy (see Appendix C).

There are political and economic obstacles to green structural reforms

Despite mounting evidence of the long-term damages associated with climate change, and hence, the benefits of avoiding or reducing them, there are clear economic and political reasons why most economies are still not committed to green structural reforms. In the aftermath of the global pandemic, many economies have experienced an increase in sovereign debt levels, which seriously constrains potential investment in green policies and projects.

In addition, there are trade-offs between the long-term gains of reforms (lower climate change damages and more resilient economies) and short-term losses (restructuring costs between dirty and green industries, stranded assets, labour transition costs). Furthermore, many green technologies are still relatively expensive and will provide less growth and employment effects than traditional investments. Mitigation investments in some economies provide less short-term social and economic benefits than education or health investments, for instance.

The time discrepancy between the (long-term) benefits of most climate policies and the (short-term) adjustment costs and investment requires strong political and institutional commitment to a green reform agenda. Without this, the long time frames required for green policies to bear fruit lead to the danger of political reversals (with new governments) and other negative supply shocks (such as war or terrorism) that increase the uncertainty and reduce the credibility of the policies.

There are also differences between economies in the core instruments needed to successfully implement green reforms: strength of governance and rule of law; institutional capacity to implement, monitor and improve policies; economic systems that can effectively compensate poor households and small and medium enterprises (SMEs).

Implementing green structural reforms is politically challenging

Green structural reforms succeed or fail on how well the political economy is managed: a climate policy package must be attractive to a majority of people and avoid impacts that appear unfair or that are concentrated in a region, sector or community (Fay et al. 2015; Schmitz, Johnson and Altenburg 2013). There are parallels in the political economy of structural reforms and green structural reforms. Both can be subject to resistance and lack of political support because the benefits materialise in the long run, but adjustment costs in the short run can be significant (Rodrik 2017).

The benefits of green reforms often take the form of intangible future ‘avoided losses’ that are hard to discern, are spread widely and will not be enjoyed by today’s electorate. These characteristics do not motivate pro-reform political pressure (Olson 1971). On the other hand, green policy reforms have the potential to create losers, such as households facing higher energy and food prices due to energy subsidy removals; or energy-intensive and trade-exposed companies losing competitiveness due to environmental regulations. The costs can be concentrated on certain constituencies, such as incumbent industries, and generate opposition, even if the sustainability and well-being gains are undeniable over the long run. Visible, immediate and concentrated policy costs can create lobbying pressure that stymies the reforms. The perceived damage to international competitiveness by domestic green policies can also foster opposition from affected sectors (de Serres, Murtin and Nicoletti 2010).

Governments can face considerable hurdles in enacting and effectively implementing green reform policies as a result (Worker and Palmer 2021). Policy design needs to reflect the political economy context, and pay due attention to managing the costs and risks of reforms, in particular their distributional impacts (see Box 4.1).

The literature identifies a number of important elements of a political economy approach to green policy reforms (de Serres, Llewellyn and Llewellyn 2011; de Serres, Murtin and Nicoletti 2010; Lütkenhorst et al. 2014; Schmitz, Johnson and Altenburg 2013; Worker and Palmer 2021):

- *Build a constituency for green reform* that includes a long-term vision and roadmap to achieving those goals. Getting social consensus can be difficult, given the differing positions of interest groups; and how the challenge is framed can be a way of reconciling them. For example, outside APEC, Finland has been successful in incorporating inclusive processes in the development of future-oriented environmental policies that include all relevant stakeholders (Koskimaa, Rapeli and Hiedanpää 2021).
- *Choose a mix of least-cost, politically feasible policies* to achieve the objective that take into account and ease the impacts of policies, particularly for those most adversely affected (de Serres, Murtin and Nicoletti 2010).
- *Communicate the broader benefits of green reform* and make clear the potential consequences of inaction. An example would be to emphasise the co-benefits (‘what’s in it for me’), highlighting benefits such as the positive health impact of cleaner air. Capacity building can promote the full understanding of the importance of green policies for stakeholders.
- *Build and sustain long-run support for the reforms*. This can be a range of measures such as making strategic use of revenues from pricing externalities to compensate ‘losers’, opening the market for new green industries, providing incentives to garner the support of stakeholders and repurposing agricultural subsidies to restore degraded

farmland (Ding et al. 2021). For example, Costa Rica assigns 3.5 percent of the revenue it earns from excise taxes on fossil fuels directly to its Payments for Environmental Services programme, which pays landowners for the environmental services produced by their lands when adopting sustainable land-use and forest-management techniques (Ding et al. 2021; United Nations Climate Change 2022).

- *Make durable and credible commitments to lock in green reforms* and safeguard against policy reversals. Public commitment to a course of action that can be easily monitored is essential. Measures include making long-term investment decisions and overcoming legislative hurdles to policy and institutional change (Lazarus 2009). Governments may wish to adopt formal accountability mechanisms to ensure that progress with green reforms is maintained and that the outcomes sought are achieved (Petrie 2022). Formal accountability mechanisms may include climate change framework legislation (as adopted by many economies) that outlines the obligations of the government, the required compliance and monitoring activities, and the consequences of non-compliance (Higham et al. 2021).

Box 4.1 Carbon pricing

Every jurisdiction in Canada has had a price on carbon pollution since 2019. Canada's approach is flexible: any province or territory can design its own pricing system tailored to local needs, or it can choose the federal pricing system. The federal government sets minimum economy-wide stringency standards (the federal benchmark) that all systems must meet to ensure they are comparable and effective in reducing greenhouse gas emissions. The federal carbon pricing system has two parts: a charge on fossil fuels, and a performance-based emissions trading system for industrial facilities, known as the Output-Based Pricing System.

Canada's carbon pricing approach is designed to help support lower income households while simultaneously incentivising behavioural change, ensuring an equitable approach to decarbonisation. All direct proceeds from the federal system are returned to the province or territory of origin. Canada has made affordability a priority, particularly for low-income and vulnerable households, through Climate Action Incentive payments. Most households receive more in payments than they face in costs due to carbon pricing. In addition, portions of the proceeds are directed to Indigenous communities and to support business competitiveness for trade-exposed small businesses, whose competitors may not face similar carbon costs.

Source: IER from Canada, 2022.

Economic shocks can exacerbate pre-existing poverty and inequality. While a green recovery is likely to create jobs in green sectors, it can also have negative impacts on the poor, such as loss of jobs in environmentally damaging sectors or higher energy prices (Dercon 2014; Laubinger, Lanzi and Chateau 2020).

The impact of COVID-19 is largest for the world's poorest people and will affect inequality and social mobility in the long run. The poorest are also likely to be harmed disproportionately by the climate crisis both because many of APEC's poorest are located in regions most affected by climate change and due to their low resources for mitigation and investment in adaptation.

APEC has already considered the relationship between structural reforms and inclusive growth (APEC 2018). In the long run, the reforms can lead to more employment, higher productivity, greater prosperity and a more sustainable environment. Lower-income and disadvantaged people, who suffer the most from climate change and pollution, also stand to benefit most from

protection and clean solutions, but face the greatest barriers to access the gains of climate policies and are disproportionately affected by their cost (Bouyé et al. 2021).

Green structural reform entails a shift away from environmentally damaging technologies and industries toward green ones. Historically, industrial change has always given rise to new jobs, and productivity growth has driven rising living standards. But such change also poses clear challenges as capital, labour and rents adjust. Changing economic patterns can cause temporary, but possibly prolonged, increases in unemployment, which are often spatially concentrated (OECD 2019c). Changing demand for skills affects wage levels and causes permanent gains or losses for certain groups of workers. Lack of appropriate skills in green industries can make it difficult for them to attract investment and can hamper their growth. At the same time, such changes in skills demand can result in unemployment in traditional industries.

Box 4.2 Microgrids in regional and remote communities

Australia's large land mass means that fringe-of-grid and off-grid customers in regional and remote locations face unique challenges in reliable and secure electricity supply. Many communities rely on long transmission lines and other infrastructure that are expensive to construct and maintain, with costs passed onto consumers. They can have their supply disrupted due to extreme weather events and bushfires causing damage to power lines and other infrastructure, and often rely on expensive diesel generation for their primary or back-up supply.

Microgrids are an innovative generation-enabling technology that often incorporate and orchestrate other priority low-emission technologies, including clean hydrogen and energy storage, electric vehicle charging, residential and industrial energy management systems, digital infrastructure, and energy efficiency.

Microgrids are particularly well suited to regional and remote areas where they can increase energy security, resilience, affordability and reduce emissions across multiple sectors and applications. They allow communities to be more energy self-sufficient and increase their resilience during extreme weather events and natural disasters, including bushfires.

In March 2019, Australia announced a Regional and Remote Communities Reliability Fund of approximately USD 35 million as part of its commitment to deliver significant investments focused on creating jobs and driving economic growth in regional and remote Australia. The fund supports feasibility studies to help communities and businesses understand how microgrids could improve the reliability, security and affordability of their energy supply.

In September 2020, additional grants totalling approximately USD 35 million were made available from the Regional Australia Microgrid Pilots Program to support the delivery of pilot studies through the Australian Renewable Energy Agency. Pilot studies will demonstrate the design and performance of microgrids to help communities further understand the benefits of investing in these systems. This programme contributes to the government's commitment to making electricity more affordable, reliable and secure for communities across Australia.

Source: Case study from Australia, 2022.

For both equity and political economy reasons, green policy packages should seek to avoid impacts that are unfair or that are concentrated in a region, sector or community, and they must be attractive to a majority of voters. Green reforms should be mindful of the short- and long-run impacts of policies, the unintended consequences, the trade-offs involved, and their distributional effects (Fay et al. 2015; Shearing 2021). They should identify the communities and assets put at risk by the reforms before adverse effects occur and ideally identify

mechanisms to mitigate the impact (see Box 4.2). At the same time, a well-being approach can help to systematically take into account environmental considerations when developing strategies and policies across an economy, thus ensuring that they do not compromise the goals of green reforms (Aguilar Jaber et al. 2020; OECD 2019a; Treasury 2021).

Addressing the needs of those adversely affected by a green transition is essential to ensure that green growth is inclusive. Governments should also aim to smooth the transition for those who stand to be affected, through a number of possible avenues:

- *Ensure consistency between climate, social and economic policies* (OECD 2019c).
- *Reduce the potential impact on existing industries*, and thus opposition to the measures, by, for example, applying policies such as regulation, pricing and/or performance standards only *to new activities*. Here, there is need to be mindful that policies to provide a softer landing for existing industries could disincentivise climate action. For example, allocating emissions units in trading schemes to existing emitting industries could undermine an effective carbon price.
- *Incentivise new green investments* while allowing the environmentally damaging capital stock to complete its economic lifespan. However, this strategy prolongs adjustment periods (Hallegatte, Fay and Vogt-Schilb 2013; Vogt-Schilb and Hallegatte 2017). As an example, in some jurisdictions, minimum energy efficiency requirements (or maximum carbon intensity levels) are imposed on new vehicles only, while owners of old and inefficient vehicles can continue to use and even sell them with few constraints (ICCT 2020; Vogt-Schilb and Hallegatte 2017).
- *Use resources from emissions pricing and the removal of subsidies for compensation measures*, such as developing social safety nets where they are insufficient; providing education, re-training and job search services for affected workers; and supporting affected industries (Fay et al. 2015; Seth 2020; Stern et al. 2020; O’Callaghan et al. 2021). Policy design tools such as transparent and clear criteria for assistance can help safeguard against capture of this support by special interests (Rodrik 2014). For example, Canada’s carbon pricing approach includes payments to households (see Box 4.1).
- *Move beyond a social co-benefit approach to proactive ‘just transitions’ planning* for equity through active social dialogue and civic engagement regarding the transition (Just Transition Initiative 2021). Collaborating with representatives of affected groups can contribute to defining indicators of social impacts and to the ability to monitor and adjust interventions accordingly (Fay et al. 2015). For example, Canada has established a Just Transition Task Force as part of its economy-wide strategy on climate change. This task force undertook extensive public consultation on actions to ensure a fair and just transition for Canadian coal workers and communities, and developed a set of recommendations, including developing and reporting on a just transition plan (Task Force on Just Transition for Canadian coal power workers and communities 2018).

PUBLIC SECTOR GOVERNANCE

Institutional capacity is critical to successful green reforms

The effectiveness of structural reforms has depended heavily on the quality of public institutions (Panizza and Lora 2002). The impact of institutional capacity and capability on economic growth has been extensively studied in the literature and it will be central to successful green structural reform (Acemoglu and Robinson 2010; Rodrik, Subramanian and

Trebbi 2004; Zhuang, de Dios and Martin 2010). Analysis of structural reforms in Latin America by Panizza and Lora (2002) shows that Argentina, Bolivia, Brazil and Costa Rica, benefited relatively more (i.e., had greater cumulative income gains) from the process of reform between the mid-1980s and end of 1990s in comparison to Colombia, Ecuador, El Salvador, Jamaica and Paraguay due to their better institutional environments and good rule of law.

Sound political institutions are essential to delivering a green recovery. The complexity of the task presents institutional capability challenges, including understanding the scientific information about climate change hazards and their impacts; understanding how broader socioeconomic processes influence vulnerabilities; integrating information about climate risk and vulnerability into policy strategies and processes; and developing suitable governance frameworks for climate risk management (Fünfgeld 2010). Shakya et al. (2018) suggest that institutions need capabilities in foresight and leadership; learning rapidly and adapting; making collaborative decisions; accessing and deploying resources; and developing and implementing policies and actions for system-wide change.

Political leaders require a mandate to embark on and continue the reform process, leadership to set out a clear direction and strategy for reform, and the ability to deal with rent-seeking and the political economy of reform. Studies across several economies indicate that those with greater public distrust of politicians and perceived corruption persistently have weaker climate policies and higher GHG emissions (Rafaty 2018).

Government agencies hold responsibility for effective implementation of the government's green policy agenda (Di Pasquale 2020; Morita and Matsumoto 2021). A strong and capable public sector is thus imperative, particularly in coordinating across different agencies and levels of government and with the private sector (Aylward-Mills et al. 2021; Lim, Ng and Zara 2021). The public sector can formulate a reform strategy: assemble and assess evidence, design and develop coherent green policy packages, assess policy options and advise the government on priority policies to put in place. A core role is providing advice to government on making decisions under uncertainty, which is particularly prevalent for green policies with long time horizons.

Building public sector capacity for green structural reforms is likely to require accommodating to the uncertainties and complexities of climate change, and include adaptive governance (Susskind and Kim 2022). Monitoring, evaluating and reviewing policies and recommending changes to government is a key part of ensuring policies are effective. Given the inherent uncertainties of green policy reforms, adjusting policies as new knowledge becomes available is important to ensuring they remain up-to-date. Establishing an evaluation framework and agenda that utilises a green lens is critical for generating new knowledge that will guide policymaking. Increasingly there is pressure for governments to ensure that specific, legally binding mechanisms exist to provide for this (Petrie 2022).

Government agencies need skills and capacities to develop, implement and manage green recovery strategies and policies

There is a risk that the complexity of green policy packages can overwhelm the capacity of public sector agencies to integrate sustainability into recovery plans (Altenburg et al. 2008). Skills and capacity gaps can result in poorly designed, duplicative or misaligned policies, incomplete implementation and patchy enforcement. Agency capability can also determine the choice of policy instruments, for example, choosing to use simple, easy-to-administer policy tools over more complex measures. Governments need to ensure that agencies have the right

skills to execute a green growth agenda by strengthening their capacity and technical capabilities, on the recognition that new policy tools require new skills to develop and administer them and that a range of different skill sets are required at different stages of the policy cycle (de Mooij et al. 2020; Shearing 2021; see also Box 4.3). This can involve assessing the skills needed and developing capacity-building programmes to upskill staff in government agencies (O’Callaghan et al. 2021).

Capacity building is central to green structural reform as well as to the implementation of the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Paris Agreement. A 2022 UNFCCC paper notes that while reporting on capacity building remains a challenge, international initiatives are underway to better equip the public sector to take action. Measures include establishing economy-wide policies and government entities to address climate change; developing climate change expertise; assessing vulnerabilities, adaptation and mitigation options, together with technology needs; and identifying priorities for action. Emerging priorities for capacity building include enhancing regional cooperation and carbon market readiness.

Box 4.3 Public sector skills for sustainability

In the US, the federal government has acknowledged that meeting the challenges of climate change requires investing in its employees and in a workforce with the knowledge and skills to effectively apply sustainability, climate adaptation and environmental stewardship across disciplines and functions.

Federal agencies will incorporate sustainability and climate adaptation into their human capital planning, including optimal staffing, training and associated resources. The federal government has developed many high-quality resources to assist federal facility managers who are implementing or coordinating internal sustainability or climate preparedness efforts.

Source: Case study from the US, 2022.

POLICY COHERENCE

Coherent policy within governmental systems is critical ...

The IERs show that most APEC economies have some form of central sustainability strategy in place and that many have specific environmental plans. Strategies such as the Powering Australia plan aim to reduce emissions in response to the ongoing economic shock of climate change (see Box 6.2).

The long-term commitment of APEC economies to green transformation as a response economic shocks is demonstrated by the strategies adopted (ADB 2020; Barbier 2020a; Lim, Ng and Zara 2021). For example, Brunei Darussalam has introduced a blueprint to diversify its economy, and move away from its high dependence on the oil and gas economy (see Box 4.4).

Japan’s Green Growth Strategy is an industrial transformation agenda encapsulating the view that global warming and the goal of net zero GHG emissions by 2050, rather than holding back growth, represent opportunities to expand its economy in new directions (see Box 4.5). It focuses on 14 growth sectors with action plans for implementation, including government support.

Box 4.4 Brunei Darussalam's Economic Blueprint

In 2021, Brunei Darussalam launched the Brunei Economic Blueprint to guide the achievement of the third goal of the Brunei Vision 2035 strategy – developing a dynamic and sustainable economy. It aims to diversify its economy away from oil and gas, which contributes 95 percent of its export earnings.

High dependence on the oil and gas sector poses major risks to the economy, from disruptions in oil and gas production, geopolitical risks and the slowdown in major global economies, amplified by the COVID-19 pandemic and trade tensions. The global financial crisis in 2008–2009 and the pandemic led to a fall in international oil prices, which heavily impacted Brunei Darussalam's economy.

The blueprint's goals are high and sustainable economic growth; economic diversification; macroeconomic stability; and a low unemployment rate. The blueprint focuses on developing a productive business environment by leveraging technology and innovation; promoting continuous learning, training and reskilling of the workforce; ensuring the economy is open and globally connected; ensuring a sustainable environment; developing infrastructure to support and grow businesses; and ensuring good governance and public service excellence. It stresses the importance of promoting research, development and innovation to develop and adopt eco-friendly and resource-efficient technologies. The government will promote investments in more green industries and limit any land and environmental degradation for economic development activities.

Source: IER from Brunei Darussalam, 2022.

In general, there is a danger, however, that strategies are developed largely in policy silos, and that key parts of government, particularly those responsible for developing structural reform policies and agendas, are not engaged. A whole-of-government approach and political commitment are needed to effectively implement green structural reforms and avoid ending up with nice plans on the paper, but poor policy implementation in reality. The Organisation for Economic Co-operation and Development (OECD) and the World Bank (2012) have proposed a number of approaches to ensure policy coherence is achieved, including:

- *Establishing environmental, economic and social objectives jointly.* The structural reform agency and other agencies need to work together to construct economy-wide strategies to best exploit possible synergies among growth, environmental sustainability and social inclusiveness, minimising potential trade-offs and building consensus around inclusive green growth strategies.
- *Diagnosing the key constraints to green growth together.* This includes identifying the key reasons for which green growth does not materialise on its own, and calling for the intervention of policymakers. Identifying the constraints is crucial in integrating green growth aspects in the structural policy agenda, as constraints can arise from a combination of market and government failures and imperfections, leading to the low attractiveness of green activities, investment and innovation.
- *Constructing policy packages that will address the impediments to green growth in the most effective and cost-efficient way given specific economy characteristics.* This includes establishing an adequate institutional framework for green growth, carefully considering interactions among instruments, trade-offs (e.g., across time, between local and global effects, or between objectives) and avoiding overlapping tools to address one objective.
- *Facilitating the adjustment and addressing any potential social impacts of green growth reforms,* in order to ensure inclusiveness and that the reforms contribute to the broader objectives of sustainable development and poverty eradication

Policy coherence will be required at all levels to ensure that green structural reforms are effective. For example, policy and delivery agencies need to work closely together, particularly in sectors such as energy, transport and agriculture. Central and local government also need to work together, given the latter is often responsible for implementing environmental strategies and regulations. Governments may wish to adopt formal accountability mechanisms to ensure that all relevant parts of government are engaged and that its objectives can be realised (Petrie 2022).

Box 4.5 Green Growth Strategy

Japan's goal of achieving net zero GHG emissions by 2050 has become the core of its growth strategy. Japan released its Green Growth Strategy to achieve this goal and address the long-term shock of global warming in June 2021.

The strategy is an industrial policy to create a positive cycle of economic growth and environmental protection. It reflects the view that responses to global warming are an opportunity for, rather than a constraint on, economic growth. Proactive implementation of measures to address global warming will lead to innovation and changes in the industrial structure and socio-economy, which in turn will drive a positive cycle of economic growth and environmental protection.

The aim is to set ambitious goals and fully support the private sector's efforts toward net zero GHG emissions. The strategy, which will be updated continuously, includes five cross-sectoral policy support measures and action plans for 14 growth sectors. The sectors include offshore windpower; fuel ammonia; hydrogen; nuclear power; mobility and battery; semiconductor and information and communications technology (ICT); maritime; logistics, people flow and infrastructure; food, agriculture, forestry and fisheries industry; aviation; carbon recycling; housing, building and next-generation photovoltaic; resource circulation; and lifestyle-related industry.

The strategy sets ambitious goals for each sector to induce private investment, supported by policy measures to create demand and reduce costs. The measures include a Green Innovation Fund to stimulate private investment in R&D; tax incentives to stimulate investment; inducing private finance through financial market rules and interest subsidies; regulatory reform in areas such as hydrogen, offshore wind power, and mobility/batteries and ensuring a global level playing field; and international cooperation on innovation policy, joint projects, standardisation and rule-making, and solutions toward decarbonisation. In addition, the government will support steady job creation and human resource development to support the transformation of the industrial structure.

The action plans for each sector include goals with clearly specified time frames for the four phases – R&D, demonstration, scale-up, commercialisation – and different levels and types of government support available at each level.

Source: Case study from Japan, 2022.

... as is timing, sequencing and prioritisation

Given uncertainty about the shape of the recovery, the sequencing of reforms is vital (OECD 2021). Economies need to adapt the sequence of the policies to the urgency of the problems and the likely benefits of action (OECD, World Bank and UN 2012) by:

- identifying and assessing the most important barriers to green recovery and prioritising interventions to address them (ADB 2020; Hughes 2020).
- focusing on removing barriers where the impact is likely to be greatest, starting with the low-hanging fruits (Hausmann, Rodrik and Velasco 2006; Rodrik 2015).

- identifying co-benefits, for example, areas in which the COVID-19 recovery and environmental priorities are best aligned (PRI 2020).
- identifying synergies between growth, environment and social impacts objectives, for example, by repurposing environmentally harmful subsidies with better targeted support for those most in need.
- developing an integrated and cohesive package of reforms to achieve multiple benefits (Buckle et al. 2020).
- setting targets, monitoring, evaluating and reporting progress and adjusting policies to improve implementation.

However, there are practical challenges in sequencing reforms. Pricing is typically recommended as a first-best policy for reducing environmental harms, including the climate impacts of carbon emissions. But there can be multiple barriers to introducing pricing, including costs, which are likely to increase with greater policy stringency; the distributional impacts of pricing, which may affect powerful blocking coalitions; the level of development of supporting legal and policymaking infrastructure and the capability of regulatory agencies; and a lack of coordination across jurisdictions leading to free-riding.

Pahle et al. (2017) conclude that sequencing incremental, second-best policy actions, including non-price measures and informal pricing that might represent a compromise on cost-effectiveness, at earlier stages could help to overcome barriers and pave the way for more stringent and cost-effective policies later (see Table C.5, in Appendix C). For example, California and the European Union have moved through three stages in developing low-carbon policies. First, they adopted green innovation and industrial policies that helped grow political support coalitions and reduce the cost of low-carbon technologies. Second, they developed carbon pricing policies. Third, they reformed their pricing policies to increase their environmental effectiveness, responding to growing political support and continuing drops in the cost of low-carbon technologies (Meckling, Sterner and Wagner 2017).

Careful policy sequencing could help facilitate the progression of pricing reforms under political constraints, but devising their timing and sequencing requires a close understanding of economy-specific circumstances and political economy. Levi et al. (2020) analyse the structural social, political and economic conditions under which carbon prices have been implemented across 262 jurisdictions and find that well-governed institutions and public attitudes are the most important conditions for the introduction of carbon pricing.

5. GREEN STRUCTURAL REFORM INSTRUMENTS

Green structural reforms are likely to involve a mix of policy instruments, since no single policy instrument will be sufficient to tackle the wide range of sources and sectors generating environmental externalities and other market failures. They include instruments required to address market failure, externalities and government issues, from market-based instruments and environmentally related regulations to complementary enabling policies (see Appendix C).

The remainder of this chapter will discuss the specific contributions that APEC's structural reform work programme can make to a green recovery. In examining these contributions, it is striking that in most cases these contributions simply entail improving the approach of APEC economies to structural reform rather than any inherent tension between structural reform and environmental sustainability. If done well, sustainable growth can also lead to higher growth long term.

SUPPORTING WELL-FUNCTIONING MARKETS

Structural reforms to improve the functioning of markets can support environmental sustainability

The Australian Productivity Commission has pointed out that where markets function efficiently, scarce resources, including environmental resources, are directed to the uses, and users, that value them most highly (Markulev and Long 2013). This can result in an allocation of resources that maximises the well-being of society. However, when markets cannot meet the societal needs of people, well-being may not be as high as it could be. This occurs, for example, in situations where resources are unaffordable or inaccessible for people because of markets not functioning well (e.g., due to lack of effective competition or information) or not being complete (e.g., as a result of externalities or the public good nature of some goods and services). As a consequence, there may be a role for governments to address externalities, facilitate the operation of efficient markets and take into account the public good aspects of the environment and other resources.

Externalities and public good issues are common forms of market failure in markets involving natural resources. They frequently lead to over-consumption of goods such as fossil fuels or a failure to provide adequate protections for the environment. As eminent economist Sir Nicholas Stern (2007) explains: 'Climate change is a result of the greatest market failure the world has seen'. His concern is that the price of a product does not reflect its true costs, in the sense that the market price does not include the climate and environmental costs imposed on society as a result of greenhouse gas (GHG) emissions and pollution. Such costs, or negative externalities, are not reflected in the price, and are borne by society as a whole. They result in social welfare loss, because the output of the product is higher than the social optimum. Consumers and others may pay these costs later, for instance, when climate change affects them in the form of droughts and wildfires, storms and floods, diseases and health concerns caused by pollution, reduced food production, exhausted resources, or even societal unrest. A 'tragedy of the commons' occurs, where overuse degrades our environment.

The International Chamber of Commerce has identified two categories of market failure that governments need to address (ICC 2020):

- *On the demand side, market failures include an unwillingness to pay for environmental or social costs unless all other consumers pay an equivalent amount, as well as hyperbolic discounting (such as underestimating the importance of future environmental damage), behavioural biases (such as the status quo bias, which discourages consumers from trying new products or changing their behaviour), and the lack of accessible and reliable information about future costs of unsustainable products.*
- *On the supply side, ‘collective action problems’ (or ‘coordination problems’) appear. Firms tend to make independent investment, innovation and production decisions to maximise their individual short-run profits. If cooperation would have been better for everyone, those independent decisions leave everyone worse off. For example, an investment in expensive clean technology or a decision to source raw materials more responsibly may raise a producer’s costs, exposing it to the risk of being undercut by rivals relying on cheap and dirty technology or raw materials, leading everyone to stay away from investing in the better alternative. That fear of first-mover disadvantage may deprive the firm from attaining the economy of scale or scope necessary to lower the average fixed costs of the sustainable alternative to a manageable level.*

These then are the types of challenges that need to be addressed in APEC economies if a green recovery is to be achieved. Structural reforms should aim to provide incentives and price signals that internalise externalities and overcome market failures. At the same time, market failure per se does not justify government intervention. Government intervention is only justified where it brings benefits to society that outweigh the costs of intervention. The most appropriate form of intervention will depend on the underlying source of market failure and an assessment of the costs and benefits of different policy options.

Market-based approaches will often be the most efficient means of addressing market failure. This is because they involve creating incentives to direct resources to where they are most valued, especially over the longer term. These can either be through market creation (e.g., tradeable emissions permits) or by using taxes and subsidies. In some cases, however, it may not be possible to employ market mechanisms to address market failure because property rights are impossible to define or enforce, or because outcomes cannot be measured. In these circumstances, direct regulatory approaches may be more appropriate.

There is no one-size-fits-all green structural reform policy package applicable across all APEC economies, all of which face different challenges and opportunities. Carbon pricing (e.g., through carbon taxes and cap-and-trade systems) is a powerful tool that could assist in a green recovery, as it both generates government revenue that could be used for green stimulus spending and incentivises cleaner choices that align with environmental objectives (Colmer et al. 2022; Green 2021; OECD 2021a). Studies of the effect of carbon pricing show modest impacts on emissions of up to 2 percent per year, although there is considerable variation across sectors (Best, Burke and Jotzo 2020; Green 2021). In some cases, environmental taxes may be more effective than pricing. The balance between pricing and other instruments and the path to green recovery is likely to reflect the specific circumstances of each economy.

COMPETITION POLICY AND LAW

Competition policy has a very important role to play in the context of the shift toward green growth strategies. To begin with, conditions of effective competition can support substantially the achievement of environmental targets within the framework of a well-designed environmental strategy for ‘green growth’. This is so given that under conditions of effective

competition, prices reflect accurately the social marginal cost of environmental externalities and provide the right incentives for the reduction of environmental pollution and for investments in green technologies.

Competitive markets support green innovation and efficient resource use

There are links between competition and productivity, and competition and innovation. These links may lend support to the notion that effective competition reinforces environmental policy as increased innovation and increased efficiency can be considered important parts of a successful environmental policy. This is because increased costs for companies resulting from compliance with environmental policy requirements and the pricing of environmental externalities make greater innovation and higher productivity more likely when the conditions for innovation such as skilled human capital, access to credit and government support are present.

At the policy level therefore, it is important for governments to adopt a competition-friendly approach to ensure the effectiveness of green growth strategies and to accompany direct government strategies to promote green innovation as outlined in the next section. For example, when it comes to competition from new technologies that promote sustainability, governments could seek to ensure that the barriers to entry for such technologies, such as outdated standards and regulations, are removed. Subsidies to promote the competitiveness of such technologies in the face of market failure may also be an option. Furthermore, a well-functioning, competitive market for GHG emissions permits is crucial to determining the appropriate price for emissions. Low prices, due for example to collusive practices, compared to the equilibrium price at a competitive level, would among other things lead to lower incentives for innovation.

When it comes to competition law, there is a lively debate on whether competition agencies should be tasked with adopting sustainability objectives alongside their established competition objectives. The balance of this debate appears to point to the notion that environmental objectives would not in fact be served by this (OECD 2020c). Rather it is important that competition agencies have clear competition objectives when seeking to deal with market power issues in markets involving potential competition from more sustainable technologies. This is because market power is often concentrated in hands of established firms that are competing on the basis of old technologies involving higher use of fossil fuels and other pollutants. Such market power is often wielded by a single large provider (e.g., in energy industries) while in some cases, established firms form cartels to protect their market position.

A key issue in competition enforcement is that if governments wish to address market failure and externalities, cooperation between firms becomes increasingly important. Many forms of cooperation may not reduce competition appreciably while in other cases there will be a trade-off to be made between competition and environmental objectives. Examples are agreements to comply with environmental legislation and to monitor compliance jointly, environmental labelling agreements and open and non-binding standardisation agreements (ICC 2020). In examining the competition policy implications of the European Green Deal, the European Commission acknowledged some competition issues would need to be addressed, including, as noted in Badea et al. (2021):

- the types of cooperation arrangement that do not typically give rise to concerns under competition laws.
- the criteria businesses should use to assess whether sustainability arrangements that could give rise to competition law concerns would benefit from exemption under domestic laws or equivalents.
- the factors that are likely to result in arrangements infringing competition laws, without the possibility of exemption.

Consumer protection law also has an important role to play in supporting the attainment of sustainability goals. Consumers often seek to buy environmentally sustainable products and consumer law can help by ensuring that consumers can make an informed choice. Furthermore, by protecting consumers and business from misleading environmental information, it can also encourage businesses to invest in and advertise green innovations. Current consumer protection law frameworks are often silent on issues relating to sustainability goals. They do not, for example, necessarily require businesses to give consumers information about environmental matters (unless, for example, not doing so would be a misleading omission). Addressing this gap could significantly sharpen market signals in support of a sustainable recovery.

REGULATORY REFORM

Competition-friendly regulatory reform is a key structural reform tool to achieving a green recovery. Regulatory reform can play the role of seeking to improve the functioning of markets where possible and of supplementing or even substituting for markets where appropriate.

Getting prices right is essential

Better pricing of environmental externalities can encourage sustainable production and consumption patterns, environmentally friendly innovation, more efficient use of resources and energy, as well as contribute to improved health outcomes through a cleaner environment, with positive repercussions for human capital, labour productivity and reduced health-related expenditures. Pricing allows the social cost of environmentally harmful activities to be reflected in private decisions. It incentivises consumers and producers to search for ways to reduce the negative impact of their activities and thus the costs associated with them through the use of alternatives, the use of existing abatement technologies and/or the development and use of new, innovative technologies. Pricing of natural resources has a similar effect as producers and consumers seek to avoid the costs by using the resource more efficiently, leading to reduced use overall.

However, getting prices right is not enough to ensure that they are adequate (in that they reflect environmental externalities), effective (in that they trigger the needed response), and acceptable (in that they can be implemented without undue opposition) (Fay et al. 2015). Green pricing reforms need to consider multiple issues:

- *An enabling environment* is critical for ensuring that pricing is an effective instrument for reducing externalities. Well-functioning, competitive product and labour markets that do not distort prices, which is the objective of structural reform policies, allow households and firms to make efficient use of resources in response to the price put on externalities.
- *The political or social acceptability of a price change* may impede implementation. There may be concerns about the impact on poor people or the need to manage powerful lobbies

opposed to reform. If responsiveness to price is low, reducing externalities to an acceptable level would involve a significant price rise, which would hurt some groups or industries and foster opposition. For example, in France there have been several failed attempts to launch a carbon tax; a strong aversion against social inequalities has resulted in opposition to any policy that imposes costs on households (Criqui, Jaccard and Sterner 2019).

- *The availability of green alternatives* at scale and competitive cost can influence whether reforms are effective. If they are not available, the effect may be muted.
- *Prices may not be high enough* to trigger green frontier innovation and a rapid economic transition (e.g., by creating a renewable energy sector or developing new urban transport technologies) even though they may reduce externalities in incumbent industries (Hallegatte, Fay and Vogt-Schilb 2013). In addition, a low carbon price in a few economies is unlikely to generate large-scale innovation because the market for products and technologies is worldwide, and not just in the economy where the innovation occurs (van den Bergh and Savin 2021).
- *The coverage of the pricing instruments* also matters. For example, excluding important sectors of the economy from a cap-and-trade system for emissions is unlikely to lead to significant reductions in emissions.
- *The price signal alone may not be sufficient* as other factors, such as missing markets, lax compliance, lack of information, or behavioural biases and cognitive failures can dampen its effectiveness (Fay et al. 2015). As a result, while pricing is an essential mechanism, it is often part of a mix of other policy options that address other impediments.

The pricing of externalities can be complemented with a number of reinforcing policy instruments to make it more effective (or it could be substituted by the reinforcing policy instruments where it cannot yet be implemented) based on an assessment of the market failure these reinforcing instruments seek to address, as well as their costs and benefits. The instruments include:

- ensuring a supportive enabling environment (e.g., structural reforms to ensure well-functioning product, labour and finance markets; defining and enforcing property rights).
- fostering the availability of low-emissions alternatives to allow firms and households to switch (e.g., through green innovation, green public transport, green energy infrastructure).
- regulation that requires switches to lower-emissions alternatives (e.g., standards for energy-efficient lighting or building codes).
- subsidies to encourage uptake of low-emissions alternatives (e.g., for electric vehicles).

Reducing environmentally harmful subsidies is a key challenge

Removal of environmentally harmful subsidies is a core part of pricing reform (see Box 5.2). Such subsidies take various direct and indirect forms, including as noted by Withana et al. (2012):

- direct transfers based on production inputs or outputs (e.g., agricultural subsidies).
- consumption subsidies (e.g., price ceilings for fuel set below market prices).
- tax credits, exemptions and rebates (e.g., favourable tax treatments for investments).
- loans and guarantees at below market prices (e.g., for new investments).
- absence of or partial resource pricing (e.g., absence of charges for wastewater discharges).

Subsidies can lead to excessive and wasteful production and/or consumption, and can also harm the environment (OECD, World Bank and UN 2012). The links between subsidies and the environment are complex, and the decision to remove a subsidy requires firm evidence that it is, in fact, environmentally harmful and that its removal would be environmentally beneficial. In addition, any environmental harms from the subsidy need to be weighed against its other objectives, such as poverty reduction (OECD 2006). Getting prices right includes reforming fossil fuel subsidies as well as other environmentally harmful subsidies, such as agricultural support schemes that incentivise the overuse of pesticides and fertiliser and excessive emissions (Fay et al. 2015).

Box 5.1 Green taxes

Chile has significant environmental problems including climate change, atmospheric pollution, and congestion and motor vehicle pollution. A large share of the population is subject to air pollution, and greenhouse gas emissions have increased with economic growth. Environmental policy has generally centred on standards and regulations.

In 2014, Chile passed a large tax reform that included the introduction of three new environmental taxes: a carbon tax, a tax for local pollutants and a tax for new vehicles. The law, a first in Latin America to reveal the social cost of local pollution and establish the ‘polluter pays’ principle as an incentive to reduce it, ratifies Chile’s commitment to combating climate change. Chile has played an active role in developing carbon pricing instruments. As part of the Green Tax, the carbon tax applies to carbon dioxide (CO₂) emissions at a uniform rate of USD 5 per tonne of CO₂.

The green taxes regime came into force in 2017, strengthening Chile’s environmental framework and providing additional, cost-effective instruments for the environmental authorities to fulfil their obligations. Revenues from the green taxes amounted to over USD 298.3 million in 2018, with the greatest contribution from the power generation sector (94 percent).

In February 2020, a new reform was approved (Law 21,210), modifying the implementation limit for the green taxes, by incorporating a technical threshold based on annual emissions. Under the new reform, all facilities with annual emissions of more than 100 tonnes of particulate matter (PM) or more than 25,000 tonnes of CO₂ must pay taxes. In addition, offsets were included as a new instrument of climate management. The new threshold coverage is thus expected to reach roughly 44 percent of total national CO₂ emissions and 94 percent of those emitted by stationary sources.

The implementation of the carbon tax has involved the establishment of various associated laws, regulations and protocols. Chile has operationalised the carbon tax through a number of steps, including identification of establishments subject to taxation; quantification of emissions; emissions declaration; emissions consolidation; tax calculation and payment; payment prorating; the establishment of a solid measurement, reporting and verification (MRV) system; and the building of capacity and knowledge throughout these processes.

The government’s strong political buy-in has ensured the successful implementation of the carbon tax. Chile’s capacities have been strengthened by involving multiple public actors in the development of the tax system and through international support. The process has been characterised by strong stakeholder involvement, for example, by involving the private sector throughout the development of necessary regulations and laws. All these efforts are being implemented to meet a binding goal of net zero emissions by 2050 in accordance with the economy’s Climate Change Framework Law issued in 2022.

Source: IER from Chile, 2022; Pinto (2020).

In this respect, eliminating wasteful and environmentally harmful public subsidies and appropriately pricing pollution and natural resources are essential, both to foster green investments and innovations and to provide revenues for the increase in public spending (Barbier 2020a). Measures include removing environmentally harmful price distortions as discussed below (e.g., fuel subsidies) and appropriate pricing of the pollutive externalities of production (e.g., through pollution taxes or cap-and-trade systems) (Burger, Kristof and Matthey 2020; O’Callaghan and Murdock 2021; Whitley et al. 2018). Taxes and cap-and-trade systems provide flexible and permanent incentives for emissions abatement that are absent in other forms of regulation and yield very similar incentives to reduce emissions (see Box 4.1 and Box 5.3). The choice of policy will depend on what is likely to work best in each economy’s circumstances (Goulder and Schein 2013). Table C.2 (Appendix C) identifies some of the issues to be considered in the choice of policy instruments.

Taxes on externalities and eliminating environmentally harmful subsidies can raise revenue and reduce public expenditure (IMF 2020; see Box 5.1). The revenues can be used to assist low-income households and disproportionately affected workers and communities as well as other critical priorities, such as health, education, or infrastructure development. Targeted social transfers to poor households (e.g., to water or fuel use) are a more direct and less expensive form of support than generalised consumption subsidies (OECD 2019d). But support to transport and other sectors most directly affected should not be provided in forms that undermine green objectives.

Box 5.2 Farming without subsidies

In the early 1980s, global events and the government's responses to them drove New Zealand toward economic collapse. To address the crisis, major reforms began in 1984 with a transition toward a market-driven economy for all sectors.

The two decades to 1984 had seen a gradual acceleration of support for the agriculture sector, including minimum prices for agricultural goods, input subsidies, low-interest loans, tax incentives and debt write-offs. It was clear by the mid-1980s that this support was not sustainable – the fiscal costs were too high, and the sector was becoming increasingly uncompetitive in international markets.

The reforms included the removal of all price support payments for farmers. Land development loans, fertiliser and irrigation subsidies, and subsidised credit were phased out from 1987, as were assistance for flood control, soil conservation and drainage schemes. These reforms were not driven by a concern for the environment; however, they have had a range of favourable environmental effects.

Subsidies for land development and for increasing livestock numbers throughout the late 1970s and early 1980s had encouraged farmers to clear indigenous bush to increase pasture area for stock and this can be linked to a rise in fertiliser usage by between 10 and 25 percent. Following the reforms, the total area of various forms of pasture declined and the area of planted forest increased. Sheep flock numbers declined and the sector diversified into more economically viable activities, including rural tourism, horticulture, viticulture and deer farming. These changes led to reductions in erosion and decreased contamination of rural waterways, prior to the rise of dairy cattle numbers in 2000.

Accommodating political arrangements facilitated a swift change during the 1980s. In 1984, economic stress resulted in the election of a new majority government that faced little opposition in passing legislation. These conditions allowed the government to make significant decisions and transform the public sector. While many of these changes were successful and have shaped the much more stable and resilient economy of today, the speed and scale of the changes, and the lack of measures to mitigate social impacts, remain controversial. A number of rural businesses stopped operating, unemployment temporarily rose and some small rural towns experienced reductions in population. Despite the hardships, very few farmers left the sector.

New Zealand now has the lowest level of agricultural subsidies in the Organisation for Economic Co-operation and Development (OECD) – less than 1 percent of producers' income. Exposing the industry to international market pressures has made it more competitive, responsive and innovative, and less burdensome on taxpayers. Reduced reliance on government support has improved resilience in the agricultural sector and the wider economy.

Source: IER from New Zealand, 2022.

Fossil fuel subsidies impede global efforts to reduce emissions

Globally, fossil fuel subsidies are a massive problem. They undermine domestic and global environmental objectives, have a sizeable fiscal cost (USD 5.9 trillion or 6.8 percent of GDP in 2020) and are an inefficient means for helping low-income households (Parry, Black and Vernon 2021). Fossil fuel subsidies may also negatively impact the ability of governments to provide adequate funding to areas such as education or healthcare. Removing inefficient fossil fuel subsidies could create much-needed fiscal space for such investments, especially while economies continue to suffer from the COVID-19 pandemic. For example, according to an International Institute for Sustainable Development (IISD) Global Subsidies Initiative (GSI) study, gradual removal of all fossil fuel subsidies, efficient and inefficient, by 2025 could generate cumulative savings close to USD 3 trillion by 2030 for the 32 economies covered by the study (Kuehl et al. 2021). Of the 32 economies, nine are APEC member economies. A modelling exercise based on only those nine APEC member economies suggests that that they

would account for cumulative savings worth USD 1.2 trillion by 2030 (APEC Committee on Trade and Investment 2021).

Within APEC, the 2010 APEC Leaders' Declaration had already acknowledged the problems generated by fossil fuel subsidies as it committed to 'rationalize and phase out inefficient fossil fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services' (APEC 2010). APEC members are currently considering options, for those members that are in a position to do so, to potentially undertake a voluntary standstill, and eventually reduce the use of fossil fuel subsidies (APEC 2021d). If a sustainable outcome is to be achieved in this area, it will be essential for APEC members to commit to structural reforms that impose discipline on the use of fossil fuel subsidies, implying the need for cooperation between APEC's trade and structural reform work programmes.

Removing subsidies can be politically difficult

But there are multiple barriers to subsidy reform. Governments may not be willing to recognise implicit subsidies such as tax exemptions or the absence of resource pricing that may effectively subsidise fossil fuels. In addition, the importance of a subsidised sector to the economy gives it political clout and creates concerns about the wider impact on the economy if subsidies are removed. There are also concerns about the disproportionate burden it imposes on vulnerable groups and small businesses in terms of rising prices and potential job losses, resulting in opposition to the reforms.

The political economy and public acceptability of emissions pricing and subsidy removal play an important role in policy design (Carattini, Carvalho and Fankhauser 2018). Acceptability can be boosted with strategies to ensure public support and social protection of vulnerable population groups, such as:

- Measures to assist low-income households, for example, through cash transfers, social support, and helping workers find different employment, that could help overcome political hesitancy.
- Maintaining support for the subsidies but making them contingent on a move to greener alternatives.
- Repurposing existing harmful subsidies (e.g., agricultural incentives) and replacing them with other forms of income support through performance-based payments that will encourage carbon-neutral or green activities (e.g., farmer adoption of nature-based farming practices) (Ding et al. 2021; Fay et al. 2015).
- Helping households and firms change their behaviours through complementary transitional measures (e.g., moving to greener energy sources) (Rentschler and Bazilian 2017).

Property rights can help improve the functioning of markets

A prerequisite for well-functioning markets is that property rights are well-defined, transparent and protected. Indeed, this in itself can in some cases significantly improve the management of natural capital. For instance, rights of land ownership and water access can help with the protection of biodiversity, reduce deforestation and over-grazing, and secure more sustainable use of water resources. The use of individual transferable quotas (ITQs) in fisheries is one example of how establishing property rights over resources that had previously been open

access can dramatically improve efficiency and sustainability in the use of resources, even though defining and enforcing the rights remain a challenge in some cases. Thus, a fundamental aspect of integrating environmental concerns into framework policies is to provide the legal and institutional basis to attribute those property rights that can play a vital role in the protection of environmental assets (OECD, World Bank and UN 2012).

Emissions trading schemes, also known as cap-and-trade, can be a cost-effective way of employing property rights to reduce GHG emissions. To incentivise firms to reduce their emissions, a government sets a cap on the maximum level of emissions and creates permits, or allowances, for each unit of emissions allowed under the cap. Emitting firms must obtain and surrender a permit for each unit of their emissions. They can obtain permits from the government or through trading with other firms. The government may choose to give the permits away free of charge or to auction them. APEC members that operate some form of an emissions trading scheme include China; Korea; New Zealand; Russia; and some US states (see Box 5.3) (APEC Economic Committee 2022). Others such as Chile; Japan; and Mexico employ carbon taxes to achieve the same objectives.

Box 5.3 Sakhalin emissions trading system pilot

Russia launched its first pilot carbon trading system in the Sakhalin region on 1 September 2022. The aim is to reach carbon neutrality – a scenario when annual greenhouse gas (GHG) emissions equal their annual absorptions – by the end of 2025. The pilot is based on the best practices of existing emissions trading schemes from around the world and Russia aims to later integrate its cap-and-trade emissions trading system into the global and regional market. It establishes a framework to implement GHG reduction technologies and test methodologies to record and verify GHG emissions and absorptions.

The Sakhalin region consists of a group of islands in Russia's Far East, north of Japan. The region is geographically isolated from continental Russia and, therefore, has unique geographical and climate settings. It is rich in fossil fuels and has great potential in renewables, primarily wind and geothermal. Ninety-five percent of the region's emissions are energy-related, while about three-quarters of its territory is forests, which absorb carbon dioxide. The region also has relatively little industry beyond several major oil-and-gas projects.

Sakhalin's relative isolation and small economy make it attractive as a test area for identifying GHG regulation measures that can be extended to other Russian regions. Besides emissions trading and a ban on all petrol and diesel cars by 2035, the region also aims to develop blue and green hydrogen production and promote sustainable management of its forests.

Source: IER and case study from Russia, 2022.

Emissions trading schemes can be controversial as governments struggle to design them in a fashion that will meet their objectives. Schmalensee and Stavins (2019) have conducted an economic review of the experience of different places operating cap-and-trade schemes over a period of 30 years. They find that such schemes can be effective if the following conditions are met:

- It is important that prior approval of trades is not required. Transaction costs could be low enough to permit considerable efficiency-enhancing trade if prior approval of trades is not required.
- It is clear from both theory and experience that a robust market requires a cap that is significantly below business-as-usual emissions.

- To avoid unnecessary price volatility, it is important for final rules (including those for allocation of allowances to companies) to be established and accurate data supplied well before companies must start operating under an allowance trading system.
- High levels of compliance in a system that requires emitters (such as coal-fired electricity generators), rather than fossil fuel producers, to purchase allowances would be important. This could be achieved by ensuring accurate emissions monitoring combined with significant penalties for non-compliance.
- Provisions allowing companies to save permits for later use, called banking, have proven to be very important for achieving maximum gains from trade, and the absence of these provisions could lead to price spikes and collapses.
- Price collars could lower costs by providing more stable prices that facilitate investment planning. A changing economy could reduce emissions below a cap, rendering it non-binding, or a growing economy could increase emissions and drive allowance prices to excessive levels. Price volatility could be reduced by combining a price floor at which the programme administrator will buy allowances with an allowance reserve from which it will sell at a price ceiling.

Regulatory policies can complement pricing signals

When seeking to deliver green growth, it will not always be possible for governments to develop market mechanisms that can deliver the pricing signals to correct market failures. In such situations, a broader toolkit will be needed to achieve the economic transformation, and implementing other measures, such as rules and regulations, or information initiatives, is essential, though their implementation should aim to preserve cost-effectiveness and environmental integrity. To this end, normal good regulatory practice (GRP) measures such as stakeholder consultation, ex ante regulatory impact assessments and ex post policy evaluation are useful tools. The use of an integrated approach in the form of a continuous and cyclic assessment of regulation allows economies to respond in a timely manner to changing economic, social and environmental conditions.

Regulatory measures can also be important when a precise pollution or resource-use limit needs to be met, for example, regarding the use or release of toxic chemicals (see Box 5.4). They can be attractive when emissions cannot be measured or monitored at reasonable cost (such as when pollution sources are small and diffuse, as in the case of agricultural run-off), and no input or output exhibits a sufficiently close and stable relationship with the pollutant to serve as a proxy. In some cases, the institutional framework is not sufficiently developed to implement pricing measures (e.g., property rights are weak or competition is not sufficient), and regulatory policies may be needed during a transition period until the necessary institutional capacity can be established. Regulations in this case impose implicit prices as a means of guiding behaviour.

Rules and regulations often rely on performance standards (e.g., setting a target on emission levels or energy consumption efficiency) or technology standards (e.g., mandating the use of a specific product or technology). As policy tools, performance standards are generally preferred to technology standards, as they provide flexibility in how consumers and producers choose to meet the standard and encourage cost-effective innovations. Performance standards can be effective, provided that enforcement can be reliably verified and the system allows flexibility in terms of searching for lowest-cost alternatives. More generally, a combination of performance standards and subsidies can come close to replicating the set of incentives provided by market prices though they may not always be cost-effective (OECD, World Bank and UN 2012).

Box 5.4 Recycling and Extended Producer Responsibility Law

Chile enacted the Recycling and Extended Producer Responsibility Law in 2016 to reduce waste generation and increase the waste reuse rate by 30 percent.

The law is based on the ‘polluter pays’ principle and holds producers and importers accountable for funding the management of waste generated by the products that are traded in the market, whether they are imported or manufactured in Chile.

It creates Extended Producer Responsibility, which compels manufacturers and importers of six priority products to recover a percentage of them (set by the Environment Ministry) once they become waste. The six priority products are (1) oils and lubricants; (2) electrical and electronic equipment; (3) batteries; (4) cells; (5) tyres; and (6) containers and packaging. Containers and packaging have the most significant positive impact on consumers.

Source: IER from Chile, 2022.

CORPORATE LAW AND GOVERNANCE

Investors and consumers are able to exert considerable influence on corporate policy. This can for example be achieved by rewarding the reduction of emissions and resource consumption, and the associated reduction in risk, through increased demand for sustainable products and services and more favourable financing terms. As a consequence, sustainable business models gain competitive advantages, and in recent years, more investors are adopting environmental, social and governance (ESG) criteria. For example, more than USD 649 billion poured into ESG-focused funds worldwide in 2021, up from the USD 285 billion that flowed into those funds in 2019 (Kerber and Jessop 2021).

However, this mechanism depends on the availability of reliable information on the environmental performance of companies (Bhattacharya, Rydge and Stern 2020). Additionally, the reporting format for companies’ environmental performance should be aligned with or integrated into their financial reporting to enable investors to make a simple and holistic assessment (see Box 5.5)⁸. The transparency thus created contributes significantly to an environmentally and socially compatible corporate policy being rewarded in the product, service and financial markets.

Business groups linked to APEC are active in this area, particularly the APEC Business Advisory Council (ABAC). In its 2021 Report to APEC Leaders, ABAC stressed that in seeking to work with governments in combating climate change, business relies on governments to implement appropriate carbon taxation and pricing systems as part of a set of interconnected actions to support climate change policies. ABAC put forward a set of ‘Climate Leadership Principles for Business’, which stressed the importance of ESG criteria in guiding future investment decisions (ABAC 2021).

⁸ In addition, some public institutions are recommending companies to adopt ESG practices. For example, the Bank of Russia moved in that direction in 2021, when it published the Recommendations for the Boards of Directors (Supervisory Boards) of Public Joint-Stock Companies on Considering Factors Related to the Environment, Social Development and Corporate Governance (ESG factors), and Sustainable Development Issues (Bank of Russia, 2021).

In APEC, work on ESG issues has been carried out largely through the Finance Ministers Process. The Finance Ministers Process is exploring funding tools, policies and best practices in the fiscal policy domain and in the financial market that can be adopted to promote green growth and sustainable finance. It is striking that many of the policy challenges that business is stressing in this regard lie in the area of structural reform. As businesses seek to transition to more sustainable activities, they are calling on governments to:

- Streamline taxation policies in the area of fossil fuels. This would entail raising existing taxes on fossil fuels, as well as imposing new taxes, while at the same time learning to live without revenue from such taxes as fossil fuel use is phased out.
- Significantly reduce fossil fuel subsidies.
- Provide market-based incentives to business and consumers to adopt green technologies.
- Put in place consistent and coherent regulatory frameworks that incentivise a transition to clean technologies.
- Encourage enhanced regulatory cooperation between APEC members based on common data sets to provide for regulatory clarity and consistency across borders.⁹

The approaches proposed by business to promote structural reform to combat climate change rely heavily on market instruments. There is a danger that business could get ahead of governments in this area and that frustration could ensue. As such, it will be important for the different parts of APEC such as the Finance Ministers Process, the Economic Committee and the Committee on Trade and Investment to cooperate closely in this work in seeking to take it forward.

Box 5.5 Financial Markets (Climate-related Disclosures and Other Matters) Amendment Act

New Zealand's Financial Markets (Climate-related Disclosures and Other Matters) Amendment Act, which will come into force in 2023, will require large financial markets participants, including listed issuers, banks, insurers, and investment scheme managers, to disclose climate-related information.

The objective of the legislation is to help smooth the transition to a more sustainable, low-emissions economy by establishing a robust climate disclosure regime, to ensure that the effects of climate change are routinely considered in business, investment, lending and insurance underwriting decisions; and help climate reporting entities better demonstrate responsibility and foresight in their consideration of climate issues – which would lead to more efficient allocation of capital. The first disclosures are expected to be made in early 2024.

Source: IER from New Zealand, 2022.

⁹ Presentations by Yuelin T. Yang and Pablo Casaux to the ABAC/PECC Virtual Roundtable on Promoting Structural Reform and Sustained Economic Growth in the Asia Pacific Region, June 2022.

STRENGTHENING THE ECONOMIC LEGAL INFRASTRUCTURE

Digital instruments can support the green economy

Strengthening the economic legal infrastructure is one of the core areas for structural reform that certainly has a key role to play in improving the functioning of markets and at the same time support green recovery.

In recent years, the use of modern digital technology to strengthen the economic legal infrastructure, especially through developing and utilising online dispute resolution (ODR), has become key to expediting inclusive and sustainable economic growth and recovery, as it makes it easier for micro, small and medium enterprises (MSMEs) to have access to environmentally friendly, faster and cheaper mechanisms to resolve disputes.

Traditional cross-border litigation and alternative dispute resolution (ADR) processes often involve physical evidence in the form of paper, international travel and physical venues that involve high consumption of energy and water and generate carbon emissions. In contrast, ODR greatly diminishes the need for such physical material, transport and consumption of energy and natural resources, thereby saving time and costs and significantly reducing the associated carbon emissions and carbon footprint (Ebner and Getz 2012).

The APEC ODR Collaborative Framework for Cross-Border B2B Disputes was developed to resolve business-to-business cross-border disputes for global businesses, particularly for MSMEs (APEC 2019). There are currently five economies participating in the framework, namely, China; Hong Kong, China; Japan; Singapore; and the US. Under the framework, listed ODR providers from the participating economies offer their own platform for online negotiation, mediation and arbitration and will regularly report their progress to APEC (APEC n.d.).

In light of pandemic-related travel restrictions and social distancing measures, courts and ADR providers have been gradually shifting toward ODR. The post-pandemic technological shift also opens the possibility of greater use of ODR by courts, particularly for domestic commercial disputes involving MSMEs. As businesses gradually emerge from the global pandemic, this could inject further impetus to the utilisation of ODR to facilitate a green economic recovery.

6. COMPLEMENTARY ENABLING INSTRUMENTS

There is a range of areas where structural reform policies can interact with other policy initiatives to promote a green recovery, including technology and innovation, investment and access to finance, and industry policies. It is particularly important to achieve policy coherence between structural reform policies in such areas as regulation and competition policies, and direct government intervention in the areas concerned. International cooperation is another vital tool if a green recovery is to be achieved.

The rest of this chapter discusses policy instruments that complement structural reforms, including measures to incentivise green innovation; to facilitate investment in green endeavours; to provide information on green products and services to inform decision-making by consumers and investors; to foster skills and training for a green economy; to promote international cooperation and to develop green industry policy to underpin the economic transition to a low-carbon economy.

INNOVATION

Green innovation is central to a green economic transformation in response to economic shocks (Stern and Valero 2021). A green recovery will require all manner of new technologies, new industries, new products, new skills and new processes to be developed and adopted in many, if not all, sectors of the economy (see Box 6.2). It will involve not only the development of green technologies and industries, but also enabling technologies such as digital technologies, including artificial intelligence, the Internet of Things and blockchain. It is also likely to encompass not just innovation through small, gradual improvements, but also disruptive or breakthrough innovations.

Green innovation requires business participation and government support

Innovation drives productivity growth and living standards. Businesses undertake the bulk of R&D, but in maximising the returns on their investments, they may not have the incentives to invest in socially beneficial innovation such as green technologies (Rodrik 2020). Because of this market failure, governments support business innovation through funding basic science, and providing subsidies and tax breaks, as well as supporting the education and training of scientists (see Box 6.1). Governments also invest in areas where incentives for business innovation are lacking. Many major innovations such as the global positioning system (GPS) came about through government intervention (Mazzucato 2013; 2021).

Business participation alone may not be sufficient to generate sustained green innovation (see Box 6.2). Government support of green innovation is likely to be needed for a number of reasons in addition to the standard market and system failure arguments for government intervention in research, science and innovation (OECD 2020b).

- *The quasi-public good nature of knowledge* makes it difficult for firms to fully appropriate the returns from their investments. This typically results in underinvestment in green innovation, even as clean technologies exhibit greater knowledge spillovers than environmentally harmful technologies (Dechezleprêtre, Martin and Mohnen 2014).
- *Demand for green innovation may be under-incentivised* by inefficient pricing. If firms and households do not have to pay for the environmental damage they inflict, they will

have little incentive to invest in green innovation. Without information, financial markets cannot effectively price the risks and rewards of green innovation.

- *Demand for green innovation will largely come through the public sector until green technologies become cost-competitive with environmentally harmful technologies and strong demand from the private sector is developed.*
- *Regulatory gaps can act as a barrier to the adoption of green technologies.* For example, new applications for hydrogen may be hampered by outdated regulations. Regulatory uncertainty (e.g., from misaligned policies) can create disincentives for investment in green innovation when the future policy environment is not known.

Box 6.1 Electric and hydrogen vehicles

In 2021, Russia announced a programme, called ‘Concept for Production Development and Use of Electric Road Transport in the Russian Federation until 2030’ to produce electric vehicles and stimulate demand for them over the next nine years, through infrastructure such as charging stations and after-sales service, eliminating regulatory barriers to electric vehicle use and providing owners a financial incentive to buy them.

The concept is aimed at creating a line of electric vehicles with improved energy efficiency and environmental friendliness, running on alternative energy sources, including hydrogen fuel cells.

The concept will be implemented in two stages. From 2021 to 2024, Russia aims to produce at least 25,000 electric vehicles and launch 9,000 new charging stations. From 2025 to 2030, electric vehicle production will increase until it reaches 10 percent of all new vehicles manufactured and 72,000 charging stations will be completed. During this time, Russia also plans to launch at least 1,000 hydrogen refuelling stations.

It is expected that in the process of forming the industry, at least 39,000 high-performance jobs will be created along the entire technological chain of producing electrochemistry, electro mechanics, electronics and electric vehicles.

Source: Case study from Russia, 2022.

Box 6.2 Powering Australia plan

Australia’s ‘Powering Australia’ plan is focused on creating jobs, cutting power bills and reducing emissions by boosting renewable energy.

Under this plan, the government will invest AUD \$20 billion to upgrade the electricity grid to support more renewable power, deliver cheaper and more reliable electricity to homes and businesses; install 400 community batteries across the country with an investment of AUD \$200 million to maximise Australia’s rooftop solar transformation; and co-invest \$100 million for 85 solar banks to ensure more households can benefit from rooftop solar and cheaper electricity.

RepuTex modelling indicates Powering Australia will generate an estimated AUD \$76 billion in investment and create 604,000 jobs by 2030, with 5 out of 6 new jobs to be created in the regions.

Alongside the economic benefits, Powering Australia will reduce Australia’s emissions to 43% below 2005 levels by 2030. The Australian government has formally lodged this target as an enhanced Nationally Determined Contribution under the Paris Agreement, putting Australia firmly on track to reach net zero by 2050.

Source: IER from Australia, 2022.

The transition to green innovation will require more than supply-side, technology-push approaches. Furthermore, while carbon taxes are important for incremental improvements to clean technology, they do not necessarily lead to breakthrough innovations (OECD 2011c). Public policy settings, including regulation, funding and infrastructure need to be designed and implemented to provide the environment for researchers and innovators to develop green innovations and deploy them profitably at scale (Jänicke and Lindemann 2010; Miedzinski et al. 2021; OECD 2012). Measures include:

- Public investment in research and support of business investment in green innovation.
- Targeted public funding of transformational technologies, for example, low-carbon infrastructure and efficient buildings (Elkerbout et al. 2020).
- Clear, long-term government commitment to green innovation, providing innovators and researchers with the confidence they need to take long-term decisions and develop green technologies (OECD 2020b).
- Environmental regulations and industry standards that can encourage technological innovation more directly (OECD 2011c; Veugelers 2012).
- Public procurement (e.g., by specifying green innovative goods and services), which could encourage green innovation by providing and enlarging core public demand, and lead markets by creating a market for green technologies that face cost disadvantages (see Box 6.3) (APEC Committee on Trade and Investment 2013).
- Addressing systemic failures of innovation to enhance performance, for example, by promoting collaborative innovation networks (OECD 2020b).
- A sound and enabling regulatory framework for innovation, aligned with policies in other areas that affect the rate and direction of innovation, including intellectual property rights, education and skills, investment and competition.

Box 6.3 Green public procurement

Thailand introduced green public procurement in 2005 to build a greener economy in response to the looming climate crisis. Subsequently, Green Procurement Promotion Plans have been implemented to increase spending on green products and services (based on various eco-labelling schemes). Participation in the scheme is voluntary.

By 2019, 97 percent of government agencies, 89 percent of state enterprises, 49 percent of universities and 36 percent of local authorities in Thailand were participating in the implementation of green public procurement. As the number of implementing entities grow, and more items are included in the eco-labelling schemes, environmental benefits and reductions in greenhouse gas emissions are expected to increase.

A review by the UN Environment Programme (UNEP 2017) identifies strong support from central government; clear guidelines and procedures; capacity building; and monitoring systems as being key to the successful implementation of green public procurement in Thailand.

Source: IER from Thailand, 2022.

Enhanced international cooperation and coordination can foster green innovation through policy convergence on environmental issues, reliance of international standards, support for international technology diffusion, trade provisions for environmental goods, and services and capacity building (APEC Committee on Trade and Investment 2013; OECD 2020b).

Box 6.4 Incorporating green elements in financial frameworks

The Philippines established the Sustainable Finance Framework in January 2022. It sets out how the Philippines intends to raise green, social or sustainability bonds, loans and other debt instruments in the international capital markets and ensure transparency and disclosure of the use of proceeds and the expected environmental and social impacts. Funds raised under the framework will be used to support projects that reflect the Philippines' commitments toward sustainable development and reducing greenhouse gas emissions by 75 percent by 2030.

Alongside the Framework, the Sustainable Finance Roadmap sets out the strategic action plan to promote sustainable finance to address climate change and other environmental and social risks. Key actions include integrating sustainability considerations into macroeconomic policies and regulations; integrating sustainability into the risk management framework of the banking, insurance and asset management sectors; encouraging sustainability and climate-related disclosures; and mobilising finance to support sustainable activities.

Complementing this Roadmap are the regulations and guidelines issued by the Bangko Sentral ng Pilipinas (BSP) and the Securities and Exchange Commission (SEC) that promote sustainable finance in the Philippines. The SEC has issued guidelines in 2018 and 2019 pertaining to the issuance of green, social and sustainability bonds by Philippine corporates, including banks. It also released the Sustainability Reporting Guidelines for Publicly Listed Companies in 2019, to promote market transparency as a contributor to informed decision making by investors.

Cognisant that climate change and environmental and social factors could pose significant concerns for individual financial institutions and the entire financial system, the BSP released the Sustainable Finance Framework and the Environmental and Social Risk Management Framework in April 2020 and October 2021, respectively. These frameworks expect banks to embed sustainability principles in their corporate governance and risk management systems, strategic objectives and operations. Moreover, banks are expected to integrate the management of environmental and social risks in every phase of credit and operational risk management systems. Recently, the BSP released the exposure draft guidelines on the integration of sustainability principles in the investment activities of banks, and it has been integrating sustainability principles in its reserve management through its investment in the Green Bond Fund of the Bank for International Settlements.

Similarly, Russia has approved a domestic taxonomy of sustainable projects, including green and adaptation projects. In 2021, the regulatory framework for green, social and sustainability bonds was adopted and it is required to disclose the information for each project specified in the bond prospectus. Furthermore, the Central Bank of Russia issued non-mandatory recommendations on the disclosure of factors related to the impact on the environment, as well as the way to incorporate these factors into project business models and development strategies. These recommendations apply to both non-financial and financial public joint stock companies.

Moreover, the Bank of Russia is currently working on regulatory amendments that will enable the issuance of Transition Bonds, Climate Transition Bonds and Sustainability-Linked Bonds.

Source: IERs from the Philippines and Russia, 2022.

INVESTMENT

Financing is crucial in the response to economic shocks. It is necessary to mobilise private investment in particular, since it is central to economic growth. However, mobilising capital for green investments can be limited by market failures, where the price mechanism is not working effectively to guide the way people invest, produce and consume. A very significant market failure affecting financial markets is the lack of sufficient information to make rational choices about the value of green investments. This includes information about the risks and opportunities of a green transition and the under-pricing of externalities. Other barriers facing

green financial markets include lack of the necessary knowledge of environmental issues and green investment skills in the financial sector, weak oversight mechanisms, short-termism, and information asymmetries (Krosinsky et al. 2021).

Addressing these challenges requires structural changes to the financial system to incorporate information about climate risks and opportunities across relevant aspects of central banking, supervision, regulation and market practices for making investment decisions (OECD 2021b; see Box 6.4).

Box 6.5 Green Finance Action Plan 2.0

The Green Finance Action Plan introduced by Chinese Taipei in 2017 relaxed rules and regulations on extending credit and financing by financial institutions to make it easier for renewable energy companies to obtain credit from banks and insurance companies. The plan also created and developed a green bond market; encouraged insurers to invest directly or indirectly in the green energy industry; cultivated financial professionals with knowledge of the green energy industry; encouraged banks to develop green credit cards; promoted a green stock index, green exchange-traded funds (ETFs) and other green financial products; and required banks and insurers to disclose their management directives for sustainable finance in their corporate social responsibility reports.

The plan has since been updated. The Green Finance Action Plan 2.0 covers sustainable finance and leverages the power of financial markets and shareholders to support Chinese Taipei's low-carbon transformation. The aim is to provide guidance for financial institutions to expand their investment and financing beyond their current focus on renewable energy and toward green and sustainable development projects (e.g., green transportation, green buildings, green manufacturing, projects of social benefit) and the development of innovative financial products and services. The plan will also enhance the quality and transparency of corporate environmental, social and governance (ESG) disclosures.

The Green Finance Action Plan 2.0, developed through public and private sector collaboration, involves encouraging credit, loans and investment in green energy industries and sustainable development projects; encouraging the development of green financial products and services including promoting green bonds and developing sustainability bonds; investing in professional development to build capability for sustainable finance; enhancing information disclosure relating to climate change and sustainable development; integrating climate change factors into prudential supervision; and international benchmarking.

Source: IER and case study from Chinese Taipei, 2022.

Financing is crucial for green growth

Access to financing, well-structured projects and well-functioning competitive markets are the cornerstones of green growth. Structural reforms that make markets work better can help support institutional investors' climate risk management and encourage increased green investment (see Box 6.5). The reforms include eliminating environmentally harmful subsidies and pricing externalities; enhancing green capital markets; developing finance structures to attract investor capital to green investments; mandating corporate climate-related disclosure, and helping investors build their capacity for environmental risk analysis (World Bank 2020a).

There are policy tools to mobilise financing toward green investment. They include as noted by Whitley et al. (2018):

- *Financial market regulation* (e.g., requiring banks that receive public support to disclose the climate readiness of their portfolio, and requiring financial institutions to manage climate risk).

- *Directing public financing to green activities* and divesting from environmentally harmful activities (e.g., through green investment funds; sovereign wealth funds, green bonds and green loans) (OECD 2021b).
- *Regulatory and voluntary instruments for disclosure* of environmental performance (e.g., regulation of corporate reporting) (see Box 5.5).
- *Removing barriers to climate finance* (i.e., fossil fuel subsidies) and using carbon pricing and other policy mechanisms to level the investment playing field for green investments (World Bank 2020a).

Further measures can be undertaken to improve the information available to investors to incentivise green investments (OECD 2021b). International progress to support an effective carbon price that reflects the true cost of carbon emissions could support more efficient flow of capital. Better, consistent, transparent, reliable, more granular and interoperable data on environmental risks and opportunities, and stronger tools and methodologies, could help investors fully understand the green investment landscape.

Improving access to finance for the public and private sectors in order to support the achievements of the goals included in the Paris Agreement is important. Policy measures to deal with climate change should be appropriate to the economies' domestic circumstances and goals and enable affordable terms for projects concerning the development, transfer and deployment of technologies that reduce GHG emissions, and enhance adaptation to address climate change.

INFORMATION

Complementary policy tools can support effective implementation, such as labelling schemes and certified standards (see Box 6.6). Trustworthy and transparent eco-labelling of products can help to provide meaningful information for consumers and create intentions to purchase items that are more environmentally sustainable. However, eco-labelling schemes on their own are unlikely to affect consumption or production decisions beyond those who are already environmentally inclined (Kaufman et al. 2020). International cooperation can support the development and use of high-integrity eco-labels and support their adoption across economies.

Box 6.6 Water-efficiency labelling and standards

The Australian Water Efficiency Labelling and Standards (WELS) scheme started in 2006 with the goal of improving water efficiency through the promotion and regulation of water-using appliances and fixtures. Building on an earlier voluntary labelling scheme, WELS is an economy-wide, government-run scheme to conserve water by helping consumers make informed decisions and encouraging uptake of water-saving technologies. The scheme allows consumers to have visibility on the water efficiency of a product and empowers them to buy products knowing how water-efficient they will be.

Experience in Australia shows that when products are labelled with their water efficiency at the point of sale, consumers use that information to choose more efficient products. This reduces household water consumption and savings increase over time as more efficient products replace less efficient ones across a community.

The scheme requires specified water-using products, including showers, tap equipment, flow controllers, lavatory equipment, urinal equipment, dishwashers, clothes washing machines, and the dryer of combination washer/dryers where water is used to dry a load, to be registered and labelled with accurate, easily understood water use information.

The functions and requirements of the WELS scheme are established through legislation and associated standards. Water efficiency standards detail the criteria for testing, rating and labelling products regulated under the WELS scheme. The WELS standard, and the powers and functions of the scheme, are established through legislation.

WELS is Australia's most successful consumer water conservation programme and among the most successful carbon reduction schemes. A 2018 evaluation of the environmental effects of the scheme estimated per capita water savings of over 112 gegalitres in 2018 – equivalent to 4,526 litres per person over the year and forecast to rise year on year and reach 231 gegalitres by 2036 – equivalent to 7,117.5 litres per person per year. An additional benefit is in energy savings as less energy is required to heat, pump and treat water, leading to a projected reduction of greenhouse gas emissions between 2006 and 2036 by over 57 million tonnes of carbon dioxide equivalents.

Source: Case study from Australia, 2022.

Box 6.7 Green factory label

Chinese Taipei's Green Factory Label is the world's first comprehensive certification system designed for factories. It combines green production (energy and water conservation, waste reduction and pollution prevention), green transportation, employee health, surrounding ecosystems, and corporate social responsibility. The system encourages industries to examine their production and manufacturing, use environmentally friendly product designs, engage in green management and fulfil their corporate social responsibility.

The goal is to transition into green industries by examining the quality of the factories, improving efficiency in the use of energy and resources in factories, and driving toward low-carbon, green and eco-friendly manufacturing. There are now 125 green factories that have passed the clean production compliance assessment. From 2018 to 2020, companies that had received green factory labels saved 870 million kWh in electricity and 8.1 million tons of water, and reduced carbon emission by 580,000 tons. A total cost savings of USD 201 million have been achieved, all while attracting investments of USD 181 million.

Source: IER from Chinese Taipei, 2022.

SKILLS

Climate change and environmental challenges affect employment. There are likely to be job losses from changes to the physical environment in sectors such as agriculture, as well as from policy changes affecting high-emitting sectors such as fossil fuel-based energy systems. On the other hand, new jobs are likely to be created as economies adopt more sustainable production and consumption practices. The transformation to greener economies through policy implementation, green innovation and changes in consumer demand is expected to significantly increase the number of jobs in the future (APEC Economic Committee 2021).

Supporting green skills is integral to the transition to a low-carbon economy

There are a number of factors affecting the ability of the labour market to support the green transition, including:

- *Informality.* Many APEC economies feature high levels of labour informality, which can limit the ability of the economy to undertake a green transition. The informal sector may not be responsive to incentives targeted at firms to support the entry of workers into green sectors.
- *Female labour force participation.* Many APEC economies feature low participation of women in the labour force, creating challenges in fostering greater participation of women in the labour force with the green transition.
- *Labour market institutions.* Flexible labour markets support the reallocation of labour into green sectors. Those that rely more heavily on higher-emissions-intensive production will have a larger reallocation need and a potentially tougher transition. On the other hand, facing structural transformation and uncertainty, workers need greater protection through stronger social safety nets. The extent of labour reallocation required will vary according to each economy's and sector's characteristics (IMF 2020).

Higher skills make job transitions easier, highlighting the potential importance of training. Skills development and training are critical enablers of a successful transition to a green economy. Building skills for a greener economy should be integrated with environmental and structural change policies by identifying current and future skill gaps and addressing skills shortfalls in priority areas (O'Callaghan and Murdock 2021; Seth 2020; Stern and Valero 2021; Strietska-Ilina et al. 2011).

The Organisation for Economic Co-operation and Development (OECD 2014) emphasises the importance of supporting the development of green skills in the transition to a low-carbon economy to avoid the serious skill shortages that could hamper effective policy implementation, and to help ensure that supply meets demand and provide stable employment for workers (see Box 4.3 and Box 6.8). This could be further strengthened by integrating topics on green skills in the curricula and programmes of basic, higher and technical-vocational education in APEC economies.

Box 6.8 Private sector skills for green innovation

Japan's Green Growth Strategy and Green Innovation Fund are aimed at promoting green innovation in companies. However, a certain degree of negative impact is to be expected, such as increased costs for human resource development and employment adjustment associated with the creation of new products/services and the transformation of the industrial structure.

In order to minimise these negative impacts, Japan will establish human resource development policies aimed at steady job creation, such as subsidy systems for companies to secure human resources and invest in human capital; education and training benefit systems; and the right environment and opportunities at local vocational training institutions, while taking into account the needs of companies.

Source: IER and case study from Japan, 2022.

GREEN INDUSTRIAL POLICY***Economic transformation is central to green growth***

Green industrial policy seeks to transform the economy by supporting the development of domestic industries that produce green or greener goods, directly address environmental problems or use greener production methods (Altenburg and Assman 2017; Cosbey 2013; Harrison, Martin and Nataraj 2017). This intent distinguishes green industrial policies from industrial and environmental policies (Allan, Lewis and Oatley 2021; Meckling 2021). Green industrial policy deliberately drives cross-sector changes in investment patterns, technologies and behaviours that lead to low-carbon, resource-efficient structural change in the economy (see Harrison, Martin and Nataraj 2017; Rodrik 2014). Because pricing alone is not sufficient to generate the shift in behaviour and investment needed for a structural transition, green industrial policy packages typically go beyond pricing and contain a mix of both market-based and non-market-based instruments such as investments, incentives, regulations, standards and policy supports to accelerate structural transformation (Altenburg and Rodrik 2017; Fay et al. 2015).

Box 6.9 Korea's New Deal

The Korean New Deal was introduced in July 2020 as an economy-wide development strategy to preemptively respond to changes in economic and social structures caused by COVID-19, support the economy's recovery from the pandemic and lead global action against climate change. The government's main goal with the initiative was to revive the pandemic-battered economy by investing in future industries that could bring a large number of jobs to Korea. The initiative's focus areas were centred on digital technology, green energy and the transition to a low-carbon economy. The New Deal initiative became a driving force for change in the post-pandemic economy. The economy saw digital and green innovation accelerate.

Following accelerated structural changes in the economy and society caused by COVID-19, the government upgraded the strategy to a new level with the Korean New Deal 2.0 in July 2021. The enhanced version aims to further accelerate Korea's digital and green energy transitions, focusing more investment on future industries and human resources.

The Korean New Deal 2.0 has four pillars: the Digital New Deal, the Green New Deal, the Human New Deal, the Regional New Deal. The Digital New Deal will expand digital investments into connected virtual platforms known as the metaverse, as well as further promote technologies such as blockchain and cloud computing. The Green New Deal is aimed at carbon neutrality and accelerating the transition to a low-carbon and eco-friendly economy. It will invest approximately USD 47 billion by 2025 in areas such as strengthening climate change response, expanding green infrastructure, spreading renewable energy and fostering green industries. It will also expand on green energy investment, including a new category targeted at reaching Korea's carbon neutrality goals through efforts such as an increase in hydrogen vehicle use and expanded emissions monitoring.

Source: IER from Korea, 2022.

The lessons from traditional industrial policy can inform policies to accelerate structural change to a green economy. Most of the arguments against industrial policy arise from implementation failures by governments, including misallocation of resources and political capture (Harrison, Martin and Nataraj 2017; Tagliapietra and Veugelers 2020).

Criticisms about effective implementation remain valid for green industrial policy (Hallegatte, Fay and Vogt-Schilb 2013). Particular attention must be paid to avoid the misallocation of resources, political capture and rent-seeking behaviours. The government needs information to efficiently and effectively direct resources, but there are substantial information asymmetries between industry and government, creating a risk of wrong decisions and misallocation of resources. Governments are not insulated from the specific interests of pressure groups and may be susceptible to rent-seeking and political capture. The interconnected nature of the economy means that transformation in one sector will generate often unanticipated responses in others, with impacts, such as employment and income effects, that need to be managed.

There are challenges in adequately pricing resources and externalities and/or creating demand for greener products. High uncertainty and long time horizons, together with short political cycles, make achieving coherent and sustained green industrial policy efforts extremely challenging. In addition, the viability of supported technologies and sectors is difficult to assess, given their dependence on continued environmental policies. Sustaining political support requires smoothing the transition for those adversely affected by change.

To help overcome these issues, Rodrik and Altenburg (2008; 2014; 2017) propose three basic principles for industrial, and green industrial, policymaking: understanding the industry and working closely and collaboratively with it to develop and continuously adapt policies;

applying clear objectives, transparent rules monitoring and evaluation, and adjusting or withdrawing support when required; and making policymakers and implementing agencies accountable.

An important part of green industrial policy is systematically steering investment to the technologies and activities the government considers to be environmentally sustainable. This requires sound evidence of the environmental threats, and the best technologies, business models and policies to address them and the trade-offs between them. This suggests there is an opportunity for APEC to identify those industries that could be supported through international cooperation. Policies include promoting clean technologies (e.g., through subsidies, standards and public procurement) and phasing out harmful activities (e.g., through environmental taxes, removal of subsidies or the mandated phase-out of activities such as coal-fired electricity generation).

More fundamentally, policies to green the economy go further than targeting individual technologies and activities. They seek to transform entire sectors, such as the energy, transport or tourism sector (Altenburg and Rodrik 2017; see Box 6.10). Structural change of this kind requires clear policy direction and the coordination of supportive parallel changes across a range of activities, including technology and regulation, as well as complementary business investment to bring it to fruition (see Box 6.11).

Box 6.10 Krabi Goes Green

The Bio-Circular-Green (BCG) Economic Model is a new strategy for inclusive and sustainable growth and post-pandemic recovery in Thailand. It is based on a combination of three existing concepts: bioeconomy, circular economy and green economy. The BCG model focuses on promoting the agriculture and food; medical and wellness; bioenergy, biomaterial and biochemical; and tourism and creative economy sectors by leveraging the economy's comparative advantage in biological resources and cultural diversity into competitive advantage.

The BCG model has been applied in Krabi to develop a strong and coordinated approach to green recovery in the tourism industry. Krabi, one of the most scenic coastal destinations in the South of Thailand, has witnessed a surge in international tourist arrivals that has led to serious problems such as marine ecological degradation, worsening pollution and mismanaged waste.

Various strategies under the BCG Action Plan 2021–2027 have been incorporated into the province's green recovery initiative named Krabi Goes Green. One strategy is to focus on high-income tourists and niche market segments, such as wellness tourism, gastronomy tourism and cultural tourism. To promote wellness tourism in Krabi, hotels and restaurants are encouraged to source produce directly from organic farms and/or farmers' associations in the area. People in the local communities are also being trained to use technology and innovation to produce value-added products for sale, such as aroma oil.

Source: Case study from Thailand, 2022.

Box 6.11 Australia's National Hydrogen Strategy

Australia's National Hydrogen Strategy was released in 2019. Its goal is for Australia to become a major producer and exporter of clean hydrogen by 2030 and meet the net zero by 2050 target.

Australia is investing more than USD 976 million into building a clean hydrogen industry; supporting the development of up to seven clean hydrogen industrial hubs (USD 323 million) in regional Australia; removing regulatory barriers to industry development, while keeping Australians safe and protecting the environment; establishing agreements with key international markets to underpin the investment; working internationally to develop an international certification scheme for hydrogen; undertaking the first National Hydrogen Infrastructure Assessment; advancing a hydrogen-ready workforce; and understanding community attitudes toward hydrogen to support the future expansion of the industry.

Hydrogen is a safe, flexible and clean fuel that can be used to power vehicles, generate electricity and produce heat while lowering carbon emissions. Hydrogen will create new industries and help existing industries make cleaner products. Building a clean, safe hydrogen industry will help Australia transition to a clean and secure energy future without compromising safety, cost of living, water availability, access to land or environmental sustainability. A 2021 review found that Australia is on track to realise its hydrogen vision. Overall, Australia's hydrogen industry is creating jobs, cutting emissions and boosting economic growth.

Source: Case study from Australia, 2022.

INTERNATIONAL COOPERATION

The global climate is an international public good. The global nature of climate change creates two distinct issues. On the one hand, there are unequal responsibilities (related to past and current emission levels). On the other hand, there are differences in mitigation capacities and adaptation needs, with different distributional impacts, across APEC economies.

No single economy can tackle climate change alone, although any single economy could scuttle efforts at addressing it. The need for international cooperation on climate change is reflected in numerous agreements related to trade and technology cooperation, as well as transboundary agreements related to water, energy, transport, etc.

There is also opportunity to increase global trade in renewable energy where economies with excess capacity can export and transmit them via cross-border energy grids. For example, Bangladesh has no substantial hydropower resources and scarcity of land to install solar or onshore windfarms (i.e., it is renewables constrained). However, it is connected to a regional grid that trades power between itself, Bhutan, India and Nepal, and therefore can still access low-cost solar and wind power from India and hydropower from Nepal (Trace 2021).

This calls for cooperation at the regional as well as the global level. The architecture of international agreements can inform domestic policy and cooperation between economies (IPCC 2021). New opportunities for cooperation are likely to arise in other areas, including emissions pricing. International coordination on carbon pricing, such as harmonising carbon prices, extending the coverage of pricing schemes, phasing out fossil fuel subsidies, developing international sectoral agreements and establishing coordination mechanisms to mitigate carbon leakage can deliver benefits, both economic (e.g., lower mitigation costs) and environmental (e.g., reducing greenhouse gas emissions and carbon leakage) (Nachtigall et al. 2021). There is also room for international cooperation in sustainable finance, including the harmonisation of policy initiatives, regulatory interventions and business strategies. The development of interoperable sustainable finance taxonomies in the region, where appropriate, could provide

an inclusive and credible system for classifying sustainable economic activities among APEC economies.

Overall, potential areas of cooperation are broad and wide-ranging. Within APEC, member economies are working together on measures to improve environmental outcomes (see Box 6.12 and Box 6.13).

Box 6.12 Green Economy Agreement

Singapore and Australia signed a Memorandum of Understanding in October 2020 to enhance cooperation on practical projects and initiatives to advance low-emissions solutions, including new and emerging low-emissions technologies. Formal negotiations on the bilateral Green Economy Agreement commenced in September 2021. This will be a world-first agreement that combines trade, economic and environmental objectives to enhance the livelihood of people and businesses while transitioning to greener economies and addressing the challenges of climate change.

The agreement will deliver on this vision by reducing barriers to the trade in environmental goods and services; fostering convergence on regulations and standards; exploring new opportunities in green growth sectors; adopting environmental measures that facilitate trade and investment in a manner consistent with existing international trade and investment obligations; and ensuring a smooth and inclusive transition into a green economy that creates good jobs for their people.

Australia and Singapore will share technical knowledge and experience and collaborate on the development of new technologies that reduce emissions. Priority cooperation areas include hydrogen; carbon capture, utilisation and storage; renewable energy trade; measurement, reporting and verification of emissions; skills development; green and transition finance; circular economy; sustainable transport.

The Green Economy Agreement builds bilateral cooperation on the green economic transition and will assist to advance regional and multilateral cooperation, including through APEC.

Source: IER from Australia, 2022.

As the premier regional forum that counts some of the world's biggest greenhouse gas emitters as its members, APEC is the venue where issues relating to climate change and the green economy can be openly discussed and acted upon. APEC has the ability to bring together a diverse range of public, private and civil society stakeholders to collaborate to support sustainability and green recovery policies. In particular, knowledge collaboration among APEC economies can be valuable in capacity building and in sharing best practices and developing tools and guidance on the effective design and implementation of policies to address environmental and sustainability issues.

APEC can facilitate a green recovery through international regulatory cooperation. Collaboration among economies on the development and adoption of international standards, guidelines and recommendations, especially for emerging industries and technologies, can help consumers make informed choices that support a green recovery, and create an enabling environment for firms to introduce green products into new markets.

In this sense, the role of APEC as a non-binding forum has provided it with an advantage in terms of facilitating discussion and being an incubator of ideas. Initiatives within APEC have served as models for environmental discussions in binding settings. For instance, in 2012, APEC member economies agreed to reduce tariffs to 5 percent or less for 54 environmental goods. This initiative served as a basis for discussions in the World Trade Organization on environmental goods, as well as the discussions regarding the chapter on the environment in

the New Zealand–United Kingdom Free Trade Agreement, which includes commitments to liberalise trade of 293 environmentally beneficial products (Ministry of Foreign Affairs and Trade 2022).

APEC’s multiple fora are well-placed to advance cross-cutting work on sustainability issues. Green structural reforms, which emphasise the centrality of well-functioning environmental markets, are complemented by a range of initiatives across areas such as trade and investment in environmental goods and services, green skills and the future of work, the adoption of digital technologies, and green finance (APEC 2021e).

Box 6.13 Joint Crediting Mechanism

The Joint Crediting Mechanism (JCM) is a project-based bilateral offset crediting mechanism initiated by Japan to facilitate the diffusion of decarbonising technologies. This diffusion, and the resulting mitigation of greenhouse gas emissions, contributes to sustainable development in developing economies.

As of September 2022, 22 economies have established the JCM. The JCM between Indonesia and Japan, signed in August 2013, is a bilateral collaboration to promote energy efficiency and renewable energy; reduce deforestation or forestry degradation; and reduce emissions from construction, waste management and manufacturing industries.

The JCM includes technology transfer, a green investment, and low-emission development, and seeks to encourage the private sector to engage in decarbonising development by providing incentives from Japan.

The JCM is Indonesia’s most progressive market-based mechanism and climate change mitigation activity with 24 projects registered and 12 projects issued carbon credits. It has generated investment of more than USD 128 million with USD 51 million in grants from Japan. The number of projects under the scheme has continued to grow and potential projects are in the pipeline. One of the breakthrough projects is the Waste Heat Recovery Utilisation project, which has the potential to reduce greenhouse gas emissions by 149,063 tonnes of carbon dioxide (CO₂) per year. Overall, annual potential emission reduction from JCM projects is estimated to be less than 1 million tonnes CO₂, but is expected to grow in the future.

Indonesia has gained significant technical experience and expertise by participating in the JCM. Benefits include new technology penetration, as companies learn the application of new technology to support the green economy; technology replication across different projects; and the impact of role models that encourage companies to invest in green technology. Challenges remain, for example, with regard to the availability of qualified human resources. However, the JCM remains an important means of supporting both economies’ commitment to reducing greenhouse gas emissions.

Source: Case study from Indonesia, 2022.

7. KEY FINDINGS AND POLICY RECOMMENDATIONS

This report responds to the APEC Economic Leaders' Aotearoa Plan of Action to implement the Putrajaya Vision 2040 that prioritises structural reform to promote innovation, as well as improve productivity and dynamism, and to combat climate change and other environmental challenges. It seeks to provide a framework to help member economies in the development of structural reforms to promote sustainable recovery from the COVID-19 pandemic as well as future economic shocks.

The world and the APEC region face immediate twin challenges: recovering from the economic slowdown related to the pandemic and tackling climate change. At the same time economies are subject to other forms of economic shocks, from natural disasters to financial crises, as well as environmental pressures of various kinds, from biodiversity loss to resource depletion.

PURSuing A GREEN RECOVERY FROM THE COVID-19 ECONOMIC SLOWDOWN

The Individual Economy Reports (IERs) and case studies contributed by APEC member economies provide a valuable source of information on how and to what extent responses to economic shocks of various kinds have incorporated green recovery measures to improve environmental outcomes, and allow for lessons to be drawn from the experiences of the economies. While APEC economies have mobilised unprecedented funding to tackle the crisis caused by the COVID-19 pandemic, most of the stimulus measures have not been directed toward environmentally related impacts. However, it is possible that some stimulus measures could create green co-benefits even if they were not the primary objective.

Recovery measures range from financial stimulus with no environmental components through to comprehensive strategies for ambitious economic transformation to a low-carbon economy. In order to build resilience, some APEC economies such as Brunei Darussalam; Korea; and Japan have announced plans during the pandemic to pursue a green transformation.

In this context, APEC's work does not involve any inherent tension between structural reform and environmental sustainability. Rather, it can be seen as facilitating a green recovery simply by extending its focus to improving the functioning of environmental markets to support both sustainability and economic growth.

In general, strategies reflect the circumstances in each economy, including its environmental challenges and its overall goals of economic adaptation or transformation. The IERs also emphasise the importance of regional cooperation in combating climate change.

IMPLEMENTING GREEN STRUCTURAL REFORMS

Governments' responses to economic shocks can provide the impetus and means to promote a green recovery that contributes both to economic growth and to improvements in environmental outcomes. The immediate response is typically to save lives and livelihoods by supporting firms and employment and sustaining demand. Fiscal stimulus spending on green initiatives is economically advantageous compared with traditional fiscal stimulus initiatives.

However, evidence from the global financial crisis and the COVID-19 pandemic shows that the proportion of fiscal stimulus spending on green initiatives is fairly small, and that most

stimulus packages are spent on business-as-usual activities. In this sense, fiscal stimulus alone is not enough for successful recovery. It needs to be supplemented by sustained wrap-around policy and structural reforms to ensure long-term benefits from stimulus initiatives are realised. Structural reform will be required as a response to the economic slowdown caused by COVID-19, and actions to combat climate change and other environmental challenges have become significantly more urgent.

FRAMEWORK FOR GREEN STRUCTURAL REFORMS: MARKET-BASED INSTRUMENTS, REGULATIONS AND COMPLEMENTARY SUPPORTING POLICIES

Broadly speaking, structural reforms contribute to removing barriers to the smooth and efficient functioning of product, capital and labour markets. They cover a range of changes to the architecture of an economy, and its institutional and regulatory framework, and often involve deregulation, liberalisation and privatisation. Structural reforms such as fiscal rationalisation, human capital investment, social protection, trade liberalisation, financial market reform, labour flexibility, and institutional development have generated significant economic and employment gains, increased competitiveness and encouraged innovation at the same time as opening up opportunities for women and vulnerable communities.

Structural reforms can be as good for the environment as they are for the economy as they seek to improve the efficiency of markets and the productivity of factors of production. They provide the framework conditions for a green recovery: a flexible, dynamic and competitive economy that provides consistent pricing of environmental goods and services that ensures resources are used efficiently; market signals that promote investment, innovation and the adoption of greener technologies; and increased regulatory certainty, particularly over the longer term.

Promoting competitive markets and regulatory reform lies at the heart of this contribution and complements APEC's existing structural reform work on services and on the digital economy. Competitive product and services markets are important to foster green innovation and technology adoption and remove barriers to entry, particularly for small, innovative firms.

Although pricing is an important part of green reforms, it alone is insufficient to drive rapid and transformative change in the economy. Market-based instruments such as establishing cap-and-trade permit systems, taxes on pollution and resource use; and support measures to provide access to environmentally friendly goods and services, among others, while critical, are not enough. Regulatory policies and complementary enabling policies are also important to promote this change.

In some cases, pricing is difficult to implement or the price signal may be weak, which requires more emphasis on the application of regulatory instruments such as standards and information requirements. Good regulatory policy ensures that regulation is enabling, performance-based, coherent and adaptive, and does not hamper the use of new green technologies and processes.

A portfolio of complementary enabling policies is also likely to be needed to support the structural reforms, by incentivising green innovation and technologies; developing new sectors; and smoothing the transition for workers and industries by helping them adjust to the new conditions. Innovation is critical to increase productivity and dynamism in this new context. The complementary measures may include supporting green innovation, facilitating investment in green initiatives (e.g., by reducing regulatory barriers; improving access to credit; or promoting the use of sustainable finance alignment tools), providing information on green

products to inform consumer and investor decision-making, supporting the development of green technologies through public procurement, promoting international cooperation and investing in training and skills for a green economy, among others.

As mentioned in Chapter 5, there is no one-size-fits-all green structural reform policy package applicable across all APEC economies, all of which face different challenges and opportunities. Carbon pricing is a powerful tool that could assist in a green recovery, as it both generates government revenue that could be allocated to green stimulus spending and to easing the transition for those adversely affected, and incentivises cleaner choices that align with environmental objectives. But the balance between carbon pricing and other instruments and the path to green recovery is likely to reflect the specific circumstances of each economy. The way reforms are implemented will also reflect the political and economic situation of each economy.

RECOMMENDATIONS

Implementing green structural reforms requires the utilisation of multiple instruments, covering several areas under the responsibility of different government institutions. The complexity of the process makes it essential to have a whole-of-government approach, where policy decisions are properly coordinated inter-institutionally to ensure a higher rate of success.

Any structural reform process includes trade-offs. The success of any structural reform will rely on suitable management of the political economy to maximise utility, resource utilisation and consultation for affected groups, and to prevent interest groups from stopping, slowing down, or reversing these reforms. Sequencing of policy measures is very important. Governments need to build up a constituency in favour of reforms and maintain the momentum by implementing policies with short-term deliverables that could be helpful in achieving medium- and long-term objectives. A solid communication strategy, married with transparent, evidence-based policy, is essential to explain the reform benefits and what would be the cost of inaction.

Starting with structural reforms that could be developed and implemented more readily with early success could facilitate the push for reforms. However, governments have to avoid a situation wherein those benefiting from the initial reforms may not push for further reforms for fear of losing the gains from the first wave of reforms.

Continuous, consistent and predictable policies are needed for effective green structural reforms. The participation of the business community and consumers is important in transforming the economy into a greener one. Resolving environmental challenges is a long-term process and policy uncertainty is one of the main barriers to transitioning to a green economy.

Skills in the government and private sector are also critical to the implementation of effective green structural reforms, and integral to the transition toward a low-carbon economy. Capacity building is therefore an essential structural reform component and this is where APEC's comparative advantage resides.

APEC could emphasise key capacity-building and knowledge-sharing activities in areas where more work is needed to transform toward a green economy. Based on the report findings, some of these potential capacity-building programmes are related to topics mainly within the purview of the Economic Committee and Senior Finance Officials, among others. For example:

- Learning how to develop pricing schemes (for instance: carbon pricing).
- Getting a better understanding on the process to develop and implement green regulatory measures, including complementary enabling policies.
- Strengthening collaboration with the private sector.
- Strengthening inter-institutional collaboration within and across economies.
- Reducing information asymmetries among different actors (for instance: government and industries, firms and consumers, inter-sectoral firms).
- Mobilising finance toward green investments, keeping in mind competitive and well-structured green investment projects.

In addition, APEC provides the stage for economies to exchange information on their experiences in implementing measures in their transition toward a green economy. Economies could learn from each other, so as to identify proven technologies and business models toward which investments should be focused. Capacity-building efforts could encourage regulatory cooperation and labour mobility agreements to help growing sectors that are becoming more relevant in this transition. These include renewable energy, recycling and product stewardship services.

Appendices



APPENDIX A. KEY LESSONS FROM ECONOMIC CRISES

Economic crises are defined as cumulative declines in gross domestic product (GDP) by at least 10 percent. It is important to study economic crises from recent history to inform current and future policy development to mitigate the impact shocks have on the economy. Each of the four main types of crises (wars and terrorist events, financial crises, natural disasters and pandemics) can induce supply and/or demand shocks.

This assessment of key lessons focuses on financial crises and pandemics, canvassing general structural reform as well as green-recovery-specific reform. Some of the most relevant crises in recent history include the Great Depression post-World War I, the early 1920s (possibly reflecting the influenza epidemic of 1918–1920), the post-World War II Latin American debt crisis, several currency crises (e.g., the 1997 Asian crisis), the global financial crisis of 2008–2009 and now COVID-19 (Barro and Ursúa 2008).

This section covers the New Zealand 1984 reforms in response to a foreign exchange crisis, the 2008–2009 global financial crisis, historical pandemics and COVID-19.

Financial crises

Financial crises are a specific subset of economic crises, causing economic downturns and following a regular pattern. A circular effect is started when there is an initial loss of confidence from businesses who do not sell what they anticipated, as well as the exit of businesses operating at the margin. Firms respond by reducing investment, stopping the hiring of employees and laying off some staff to manage tightening balance sheets.

Households reinforce the downturn by limiting consumption, particularly those without jobs. Increased uncertainty makes households save more out of caution, which forces firms to reduce investment and hiring further (Stiglitz 2015). Accessing credit during financial crises becomes difficult since banks see more bankruptcies, defaults and foreclosures, and become less willing to lend. Households and firms that *are* willing to spend are likely unable to access the funds they need at reasonable terms (Stiglitz 2020b).

Deflationary and disinflationary tendencies exacerbate this since debtors end up paying back more than anticipated in real terms. If creditors are repaid, they get more in real terms than they had thought. Overall those who gain expand spending less than the losers contract spending, which means aggregate demand contracts and a long-lasting, vicious downward spiral is potentially created (Stiglitz 2015).

Arising from this is the key lesson that without early and sustained fiscal support that is commensurate in size with the shock the economy has experienced, recovery will be slow and stunted (Stiglitz 2020b).

New Zealand's 1984 reforms

In 1984, New Zealand implemented widespread economic reforms to deregulate the economy in response to a foreign exchange crisis. The currency was floated, price and income controls were relaxed, state-owned enterprises, such as the New Zealand's government-linked airline, were corporatised, government accounting was scrutinised, and outputs rather than inputs were monitored in government departments (Bollard 2009; Brash 1999; Carroll 2012; Dalziel 2002; Evans, Grimes and Wilkinson 1996; Henderson 1996; Mintrom and Thomas 2019; Stillman,

Velamuri and Aitken 2010). These reforms transformed New Zealand, helped the economy to recover and provided better access to a wider range of goods and services through international trade. The reforms, however, did not come without complications. Some lessons can therefore be learned from the New Zealand experience.

Removal of subsidies helped to send the right price signals for change, particularly toward better environmental resource use

Prior to the 1984 reforms, New Zealand's agriculture and food industries (as primary contributors to New Zealand's exports) enjoyed heavy protection via subsidies and price and income support that distorted the prices of agriculture and food products (CBD n.d.). The subsidies resulted in over 2 million hectares of marginal land being farmed, when otherwise it would not have been profitable to do so; there was also over-production of agriculture and food products such as meat to the point of wastage and government-paid slaughter (CBD n.d.; MPI 2017). Both the farming of marginal land and over-production had considerable negative effects on the environment (Vitalis 2007).

The removal of subsidies was part of the wider reforms in 1984 and 1986 for agriculture and fisheries respectively. The aim was to treat farming and fisheries like any other business and facilitate market-driven, competitive and efficient environments (MPI 2017). The removal was importantly coupled with changes to management systems for both agricultural and fisheries industries (e.g., loan restructuring support throughout agriculture; introduction of quota management systems and share buyouts for fisheries). Only about 5 percent of farmers left the land between 1985 and 1989, not significantly more than the normal rate, largely due to the government's transition programmes, which were designed to keep viable farms in operation. These measures included the retention of marketing boards and writing off much of the farmers' debt, as well as help with debt and social welfare payments for individual farmers in financial difficulty (Jardine 2010). Removing the subsidies in isolation, without coupling the action with other reform, would most likely have caused significantly greater financial and social distress (Vitalis 2007).

Support for the reform activity and removal of subsidies from farmers' organisations and consumer groups contributed to its success (CBD n.d.). Farmers were given clear signals by the government of the intention and size of the reform as well as the benefits of it (Vitalis 2007).

The removal of subsidies had positive effects on the size, profitability, efficiency, innovativeness and employment opportunities of the agricultural sector in New Zealand (Ballinal and Lattimore 2004; Rae, Nixon and Lattimore 2004; Sandrey et al. 1990; St Clair 2002; Vitalis 2007). Rural economies, once reliant on agriculture, diversified to include other services and tourism. There were also environmental benefits realised because of the removal of subsidies, including a reduction in the amount of land used for farming, likely lower level of fertiliser use and reductions in the rate of increase in water use for irrigation over time (OECD n.d.; Trimble 2018; Vitalis 2007).

This example highlights the importance of pricing resources correctly to provide the appropriate incentives when it comes to resource use and green development. There are potential dangers of including subsidies as part of green reform if the pricing is wrong and incentivises inefficient use of resources. Where subsidies are imperative, use of income grants or deficiency payments may be best since they do not give control of market demand to farm organisations (Lattimore 2006). Places such as the Global Subsidies Initiative (GSI) illustrate

quantitatively the effects subsidies can have on sustainable development (Charles et al. 2013). There is scope to do further testing to understand the effect subsidies have on sustainable development and green outcomes.

Strong leadership and consistency of policies and communications are key to successful reform

Fiscal consolidation and radical consolidation in the public sector are possible (Evans, Grimes, and Wilkinson 1996). Successful, sustainable and low-cost reform requires strong leadership and a confident approach that is fully committed to deliver quality outcomes, coupled with consistency of policy and communications (Douglas 1990). The objectives and end point of the reform must be clearly defined and communicated to the public. It is important to demonstrate how and where improvements will be realised, while protecting the vulnerable groups of society. Governments must also ensure that the reform programme is seen through to completion (Douglas 1990).

Some decisions would see their benefits become evident only over the medium to long term. Governments compromising on those decisions to gain immediate advantage and public acceptance could cause public dissatisfaction to intensify over time. Consensus does not arise before quality decisions, but rather progressively once the decisions have been implemented and the reforms begin to realise their promise (Douglas 1990).

Speed can help to limit the costs of reform, but that is not the only way forward

Maximising the speed of reform is one way to limit political uncertainty and limit the trade-off costs of the reform (Douglas 1990). Others have commented that while speed is one approach, more recent governments in New Zealand have achieved successful reforms at slower rates (Mintrom and Thomas 2019). At the crux of this is the importance of careful implementation and policy design to ensure appropriate actions are taken.

Sequencing is important, as is early mobilisation of the labour force

The sequencing of the reform activities in 1984 was less than ideal and resulted in higher than expected social and economic costs (Brash 1998). Part of this higher cost was thought to be because labour markets had not been deregulated early in the reforms (Evans, Grimes and Wilkinson 1996). Planning and sequencing of reforms should focus on early mobilisation of the labour force to minimise costs associated with market frictions and delay.

Despite sequencing issues, successful reforms in certain sectors of the economy early in the programme established a strong footing for successful reforms later in other sections of the economy that were more politically controversial (Evans, Grimes and Wilkinson 1996; Mintrom and Thomas 2019). Conducting reform of multiple things at once meant costs to any one sector or previously privileged group were compensated or obfuscated by gains to the sector originating from reforms elsewhere, helping with the viability and public support of the reforms (Douglas 1990; Evans, Grimes and Wilkinson 1996).

Global financial crisis 2008–2009

The downturn in the US housing market was the catalyst for the global financial crisis of 2008–2009. The crisis was caused by banks taking excessive risks, lowering lending thresholds, and regulatory and policy errors regarding subprime lending. There were expectations that house

prices would continue to rise in favourable economic conditions, and therefore households increased their borrowings to build and buy houses. Market conditions made it easy for less-than-optimal borrowers to get finance. Banks and investors at the same time were increasing their borrowing to increase leverage in the hope of realising extra profits.

When house prices started to fall, a rising number of borrowers were unable to repay their loans. House prices continued to fall, and the number of defaulters increased. Banks and investors started to make considerable losses. The situation worsened and worsened over time. Eventually, large financial institutions such as Lehman Brothers failed, triggering global panic in the financial markets and the withdrawal of investment funds for fear of losing them. This sparked one of the deepest economic downturns since the Great Depression.

The global financial crisis required governments around the world to enact strong policy responses to mitigate the potential damage. Those responses provide some lessons for how to construct successful social reform post-COVID, with respect to both general economic recovery as well as a green recovery.

Existing policies provide strong basis for reform programmes

Structural reforms in the wake of a crisis should be timely, temporary and targeted (Elmendorf and Furman 2008). Reforms should build on existing policies and programmes since this usually delivers the biggest economic and employment returns (IEA 2020; O’Callaghan et al. 2021).

To ‘green’ the reform, policies should also focus on behavioural nudges away from fossil fuels

Reform policies for a green recovery need to provide behavioural incentives to move away from fossil fuels by cutting subsidies and pricing the fuels correctly (Barbier 2010a; 2010b; 2020a). Tying financial support for industries/companies to ecological conditions can also force behaviour changes and give the stimulus lasting effects (Burger, Kristof and Matthey 2020).

Stimulus alone is not enough for successful reform, there needs to be a wrap-around policy

A typical reform sees fiscal stimulus being exercised. However, stimulus alone is not enough to encourage large-scale structural change in market behaviours (Mundaca and Luth Richter 2015). Stimulus must be accompanied by both demand- and supply-side policies, and the policies must be appropriate and sustained to ensure that the long-term benefits from the stimulus are realised (Barbier 2010b; Carley et al. 2011; Cœuré 2014; Hughes 2020; Johansson et al. 2012; Mundaca and Luth Richter 2015; Mundaca, Markandya and Nørgaard 2013; O’Callaghan et al. 2021).

Necessary requirements for stimulus to be successful

It is necessary that stimulus and investment initiatives are synchronised with training opportunities for the labour force, and that technology is ready to support the initiatives (IEA 2020).

The composition of the stimulus is important (Sonnenschein and Mundaca 2015). There needs to be analysis of where the greatest returns to investment are with respect to the environment,

decarbonisation and sustainable development. The stimulus must also be clearly labelled for either a short- or long-term purpose; the accompanying policies are necessarily different across different time horizons (i.e., emergency relief in the short term, compared to full transition in the long term) (Barbier 2020b).

Stimulus must be affordable for the economy, otherwise it will not work and could jeopardise the future performance of the economy and its ability to meet environmental sustainability goals (Barbier 2020b).

Pandemics

The relatively recent globalisation of economies, and their concomitant interdependence, has led to disease developing in ways previously unseen (Tang 2021). This likely means modern policy responses would have to differ from those historically used. Additionally, given that economies vary vastly in their institutional characteristics, reform policy must be context-specific (Callegari and Feder 2021).

Pandemics have significant long-term economic impacts

Pandemics across history have had significant impacts on economies both in the short and long term. The 1918 influenza pandemic generated declines of between 6 to 8 percent in GDP and consumption (Barro, Ursúa and Weng 2020). There is also evidence that higher flu death rates decreased realised real returns on stocks, especially on short-term government bills (Barro, Ursúa and Weng 2020). Significant macroeconomic effects of pandemics have been said to persist for about 40 years, with real rates of return substantially depressed, consistent with the induced labour scarcity and increase in real wages due to the pandemic (Jordà, Singh and Taylor 2020). Reform policies must therefore consider the long-term implications of the pandemic on the economy, in conjunction with short- and medium-term recovery goals.

Household behaviour is key driver of economic impacts

The main effects of pandemics on the economy are not because of the deaths and infections themselves, but rather the behavioural changes made to avoid infection as well as morbidities that put pressure on health systems long term (Kilbourne 2004). This includes closures of businesses and schools, with impacts skewed toward labour-intensive jobs where social distancing renders employees unable to work (Kilbourne 2004). It is important that modelling of economies to inform policy take into account individuals' economic behaviour changes, particularly with respect to social distancing (Hur and Jenuwine 2020).

There is some evidence that pandemics have negative impacts on income distribution (i.e., a widening of the inequality gap) in some places, likely due to the fact lower income households are restricted by the spread of disease in their ability to work and find jobs (particularly jobs that cannot be conducted remotely) (Das, Bisai and Ghosh 2021). At the other end of the spectrum, pandemics may increase opportunities for capital earners. Policy and stimulus should therefore consider vulnerable societal groups who are those most likely to be immobile and unable to work. At a higher level, pandemics have disparate effects on developing economies with weaker health systems and less economic resilience (McKibbin and Sidorenko 2006).

Lessons from COVID-19

While the full effects of COVID-19 may not have been realised yet, there are important initial lessons arising in the literature that mirror some of, and add to, the lessons from other pandemics. COVID-19 has simultaneously decreased the demand for, and supply of, certain products and is considered a supply and demand shock, occurring at the same time as a climate shock (Dua et al. 2020; Stiglitz 2020b; Wagner and Weitzman 2015).

Reductions in economic activity due to social distancing and restrictions

Economies with more stringent lockdowns have experienced sharper GDP contractions (Bricongne and Meunier 2021). Even without lockdowns, the spread of the virus has affected economic activity due to voluntary social distancing, heightened uncertainty and deteriorating economic prospects (Baek et al. 2020; Baker et al. 2020; Noy, Ferrarini and Park 2020). Expectations, modelling and estimates should consider this, particularly given increases in the ability for remote work.

Risk management and resilience must be built into reforms and policy responses

COVID-19 has highlighted the systemic frailty of the global economy and societies, and the importance of adequate preparedness and appropriate risk management for pandemics (EEA 2021b; UN 2020). Risk management and health infrastructure resilience must be built into the planning and policy environment moving forward. Policy must also ensure those most disadvantaged by COVID-19 do not continue to be, particularly when implementing any green reform measures (Nawaz 2020).

Recognition of tax reform's role in inclusive growth and reform strategies

Tax reform has been recognised as a potential way for inclusive growth post-COVID in most economies, including progressive personal income tax systems, neutral taxation of capital and corporate income, broader value-added tax (VAT) bases, and better/more use of carbon taxes, property taxes and inheritance taxes (de Mooij et al. 2020).

Focus on multi-level coordination in economies for strong reform

COVID-19 has also highlighted the importance of multi-level coordination between local, regional and central bodies in their responses to the pandemic to limit the effects on society's health and wealth (UN Habitat 2021). Regional integration of cities and investment into shared resources are important for developing sustainable infrastructure, advancing digital inclusion, and promoting the viability of urban economies. There is also the potential to use COVID-19 as an opportunity to redevelop the social contract and invest in health and prevention, basic housing and basic incomes (UN Habitat 2021).

APPENDIX B. GREENING THE FISCAL STIMULUS RESPONSE AND RECOVERY

As highlighted in Appendix A on lessons from past crises, fiscal stimulus is necessarily coupled with appropriate and robust policies to ensure that the long-term benefits of structural reform are realised, particularly when considering a green recovery. What is also important is the composition of any fiscal stimulus and how it works to maximise returns on green activity in terms of, for example, the environment, decarbonisation and sustainable development. This section summarises the extensive literature on how fiscal stimulus measures (as part of wider policy responses) could help to create a green recovery.

Stimulus will differ based on context of an economy

The package of reforms will be different for major economies and low- and middle-income economies, reflecting their different structural conditions and needs (Barbier 2020a). As such, the type of stimulus is important in maximising returns given an economy's context. Successful green reform requires assessment of stimulus measures with respect to multiple complex factors, including socioeconomic impact, climate impact, the time frame for the stimulus to take effect, the time frame in which carbon emissions are to be reduced and the feasibility of the stimulus. Most importantly for a green recovery is that fiscal stimulus is directed toward actions that decouple economic activity and carbon emissions (Shearing 2021).

Economies must form robust assessments of stimulus measures before committing to investment

Economies need to ensure that the stimulus measures put forward are robust by assessing their components and characteristics, as well as their fiscal sustainability (Barbier 2020a). In part, this requires that the stimulus is designed to meet a dual purpose, addressing both economic and environmental priorities at once (Engel et al. 2020; Shearing 2021). The stimulus should also be designed in accordance with global climate change priorities to ensure stimulus money flows to activities that are expected to be in a future green economy (Elkerbout et al. 2020). This will ensure maximum return on investment with respect to future environmental protection, decarbonisation and sustainable development.

When enacting a stimulus, economies should balance short-term boosts to economic activity and employment with good quality and sustainable employment (where it is most needed) that will build both skills and future resilience (Di Pasquale 2020).

Public spending can provide greater returns than other stimuli

Well-directed public spending, particularly investments in a green transition, can be timely, labour-intensive (important with rising unemployment) and highly stimulative, delivering a far greater return on investment than tax cuts for example (Hepburn et al. 2020). Many stimulus measures produce the greatest benefits if delivered through a combination of pushes and pulls, where pulls include tax credits/subsidies, grants, loans and loan guarantees, and direct government ownership, and pushes refer to regulation. Indirect nudges to change behaviour can also complement and reinforce more direct measures of stimulus (Engel et al. 2020).

Where used, public spending should be focused on green activities

Governments should focus on green rather than environmentally harmful activities when considering stimulus (IMF 2020). Green activities could include boosting low-emissions infrastructure (e.g., renewable energy, modernisation of electricity grids, public transport, improving digital infrastructure for telework capability), developing and adopting clean technologies (e.g., battery, hydrogen and carbon capture) and supporting climate adaptation (e.g., flood protection, roading and building resilience). Ultimately, governments should be avoiding emissions-intensive investments like fossil fuel power and high-emissions vehicles. Governments can also maximise the impact of fiscal stimulus through a range of mechanisms, including:

- increasing green spending through public procurement, that is, on items that show up directly in their balance sheets (green measures would include retrofitting buildings to make them more energy efficient, or investing in public transport and renewable energy).
- mobilising private sector investment and engaging in public–private partnerships, including government loan guarantees or refundable tax credits targeted at private sector investments in green recovery measures (World Bank 2020c).

Investing in green rather than environmentally harmful activities also means that financing (both debt and/or equity) will be more readily available for sustainable projects (Krosinsky et al. 2021). This may be particularly important for economies that would otherwise struggle to obtain financing for projects that are relevant for the successful implementation of reforms in the wake of the COVID-19 crisis. Focusing on green investments also lead to existing financial portfolios being restructured to favour companies with environmentally sustainable business plans and performance (Krosinsky et al. 2021). There are therefore incentives to investing in green activities.

Green stimulus promises greater, quicker returns and opportunity for inclusive growth

Focusing stimulus measures on decarbonisation and carbon capture through nature-based solutions has been shown empirically to be the cheapest and shortest route to economic prosperity, offering greater returns than investment into environmentally detrimental areas and activities. Batini et al. (2021) used novel international energy project spending data to estimate multipliers for clean energy (e.g., hydroelectricity, nuclear, solar, wind, etc.) and biodiversity conservation (e.g., actions to restore natural or modified ecosystems) and found that the estimated multipliers associated with green spending are between two to seven times larger than those associated with non-eco-friendly expenditure, depending on sectors, technologies and horizons.

Green infrastructure projects have potential to quickly create large numbers of jobs across economies and not exacerbate existing regional disadvantages, which is important when considering successful green reform that is also inclusive (Di Pasquale 2020).¹⁰

¹⁰ This potential, however, is dependent on the ability of the labour force to be absorbed into green infrastructure projects through appropriate training and skillsets. A mismatch between the requirements of green infrastructure

The COVID-19 recovery also provides an opportunity for fiscal stimulus to be tied to additional uplifts of society. For example, companies receiving help from fiscal stimulus programmes could (and should) be required as a condition of access to contribute to the likes of social and racial justice, improved health, and the infrastructure and impetus required to shift to a greener, more knowledge-based economy (Di Pasquale 2020; Stiglitz 2020a).

Green stimulus options from the literature

The literature describes a range of COVID-19 green recovery interventions and stimulus options to support low-carbon development and climate and disaster resilience, while simultaneously creating jobs, jumpstarting growth, and improving equality across societal groups (Di Pasquale 2020; Harvey 2020; Hughes 2020; WEF 2021; WHO 2020; World Bank 2021). They include:

- labour market programmes to protect natural assets and green infrastructure.
- health projects promoting disaster preparedness planning, such as long-term improvements in post-disaster disease surveillance systems.
- construction of health facilities that meet disaster and climate resilience standards.
- technical and vocational education projects to promote low-carbon industries and resilient livelihoods.
- energy efficiency schemes, including support for retrofits (such as low-interest loans), construction of low-energy buildings, and skill development.
- improvements in regional cooperation for more sustainable food supply and resource use.
- financial incentives, preferential loans, and grants for low-carbon and resilience-building programmes, such as energy-efficient roofing and residences, low-cost housing, and circular-economy activities.
- capacity building of grassroots women's groups to prepare them for disasters and emergencies.
- rural green infrastructure projects, such as grid expansion and off-grid rural electrification.
- rural low-carbon household programmes, such as 'clean cooking' initiatives (e.g., biogas capture, efficient woodburning stoves) and solar lighting.
- improvements in climate-friendly agriculture value chains and sustainable food supply management programmes.

projects and the labour force ability will make it harder to close any gaps within the economy and have inclusive growth.

APPENDIX C. GREEN POLICY INSTRUMENTS

Policy instruments that could be drawn on for a green recovery include market instruments (e.g., carbon pricing), non-market instruments (e.g., regulation) and complementary measures (e.g., innovation). Pricing, that is, structural reforms to ensure well-functioning markets for environmental services, is likely to play a key role in any green policy portfolio. This section outlines for reference purposes some of key considerations in the choice of policy instruments for a green recovery.

Green policy packages to address the constraints to a green recovery

Green policy packages need to encourage sustainable behaviour by firms and consumers, facilitate the reallocation of capital and technology toward greener activities and ease the transition for those most adversely affected.

The Organisation for Economic Co-operation and Development (OECD 2011a), drawing on Hausmann, Rodrik and Velsaco (2006), identifies the key constraints to green growth as arising from the fact that private returns on green activity and investment are less than the social returns. First, there may be barriers to change and innovation, for example, from path dependency or capacity constraints. Second, the private sector may not be able to fully appropriate the returns from green activities, thereby blunting incentives for investing in, for example, energy-efficient buildings (OECD 2011b).

The gap between the private returns from economic activity and the overall benefits that accrue to society can arise from a mix of market failures (such as externalities), government failures (such as misguided or ineffective government policies) and market constraints (such as lack of access to skills and capital). See Table C.1 for examples. Green recovery policies aim to close that gap and raise returns on green investment and innovation while easing the transition for those adversely affected and managing the negative economic impacts on firms.

Governments need to assess the most important constraints and prioritise a suite of interventions to address them (ADB 2020; Hughes 2020; OECD, World Bank and UN 2012; Rodrik 2015). An integrated and cohesive package of reforms should seek to achieve multiple benefits and synergies between growth, environmental and social objectives (Buckle et al. 2020). In particular, policymakers need to consider trade-offs, the impact of the policy packages and any unintended consequences on inclusiveness. In responding to economic shocks such as COVID-19, co-benefits should be included, for example, areas in which the recovery and decarbonisation priorities are best aligned (PRI 2020).

Green policy packages will differ across APEC economies as they each face different constraints with different policy prescriptions.

Table C.1 Possible constraints on green growth and recovery

Failure	Mechanism
<i>Market failures</i>	
Information asymmetries	Consumers and investors lack information on environmental impacts that is required for decision making
Externalities	Negative externalities unpriced Positive externalities not rewarded
Public goods	Lack of infrastructure (e.g., physical, digital) due to too low a return on investment for private investors Underinvestment in R&D due to knowledge spillovers from public good nature of knowledge
Missing markets	Incomplete property rights (e.g., pollution markets) Absence of legal framework for new green industries (e.g., hydrogen) Absence of market (e.g., for recycling)
Market power	Barriers to competition Government monopolies (e.g., in network industries)
<i>Market imperfections</i>	
Market constraints	Access to finance Liquidity constraints Lack of skilled labour
<i>Government failures</i>	
Direction-setting	Lack of shared vision regarding the goal and direction of green recovery Lack of policy coherence Lack of targets and/or monitoring and evaluation
Governance	Poor coordination between government agencies at both the central and sub-central levels Poor coordination between environmental, sectoral and economic policies
Policy	Underinvestment by private sector due to regulatory uncertainty Poor rule of law Environmentally harmful activities incentivised by regulation Environmentally harmful activities not regulated No legal framework for environmentally beneficial activities Regulatory barriers to competition Regulatory barriers to new green industries (e.g., outdated regulation or lack of regulatory frameworks) Weak enforcement of regulations
Investment	Lack of investment in public infrastructure (e.g., for hydrogen) Low levels of investment in green innovation and technology Lack of investment in green skills training
Capacity and capability	Lack of public sector capacity and capability to design and implement policy
Political economy	Rent-seeking by incumbents Opposition by affected sectors and communities
<i>Macroeconomic environment</i>	
Fiscal policy	Distortionary taxes and subsidies

Source: Based on Capasso et al. (2019); Hopkins and Greenfield (2021); OECD (2011b); Weber and Rohrer (2012).

Green policy packages are likely to involve a mix of policy instruments

No single policy instrument will be sufficient to tackle the wide range of sources and sectors generating environmental problems. Selecting the appropriate suite of policy instruments involves considerations such as the nature and size of the predominant environmental issues to be addressed, the cost-effectiveness of the instruments to address them and their administrative feasibility, and the political economy associated with their implementation (see Table C.2).

Table C.2 Considerations for choice of policy instruments

Factor	Issues in choice of instrument
Nature of the environmental problem	Nature of the market failure to be addressed Magnitude of the environmental problem Identifiable, concentrated or diffuse source Local, economy-wide or cross-boundary impacts
Cost-effectiveness	Effectiveness – will it work to address the problem Side effects – additional costs or co-benefits Time frame – how long before results are seen Targeted – addresses the problem itself or a proxy Static efficiency – achieves objective at least cost Allocative efficiency – minimises distortions Dynamic efficiency – creates incentives for cheaper abatement options Risk and uncertainty – ecological and policy
Administrative feasibility	Complexity of design and administration New or adjustments to existing instruments (e.g., taxes) Information asymmetries Measurement, monitoring and enforcement costs Compliance costs and incentives Ability to cope with uncertainty (e.g., learn and adjust policy) Overlaps with other instruments
Political economy	Economic implications (e.g., sectoral shifts, jobs, competitiveness) Impacts on individuals (e.g., higher prices) and industries (e.g., stranded assets) Concentrated or diffuse impacts (e.g., demographic, sectoral, regional) Timing of costs and benefits (e.g., inter-generational) Visibility of costs and benefits (e.g., taxes vs standards) Mismatch between those who bear costs and benefits Compensation mechanisms for those most negatively affected (e.g., re-training)

Source: Drawn from de Serres, Murtin and Nicoletti (2010) and Johnson and Hascic (2009).

Designing a policy package that both achieves its objectives at least cost and is politically feasible involves a range of trade-offs and may not involve the first-best set of options (de Serres, Murtin and Nicoletti 2010). For example, standards rather than a tax could be politically feasible even if a tax would be more cost-effective, since the costs are less visible. Building support for any policy package includes how best to overcome resistance to change and compensate those who are most adversely affected.

Green policies include market and non-market tools

The range of policy instruments to draw on for a green recovery is shown in Table C.3. A well-designed policy mix may make use of synergies among individual instruments, thus becoming more effective than the sum of its individual parts. The instruments include:

- market-based tools for pricing negative environmental externalities, such as polluting emissions and inefficient use of scarce natural resources.
- non-market policies such as regulations and standards to complement price-based instruments.

- complementary enabling policies such as innovation, investment, capacity building and international cooperation.

Table C.3 Examples of green policy instruments

Instrument	Examples of applications
<i>Market-based instruments</i>	
Cap-and-trade permit systems	Greenhouse gas (GHG) emission reductions Air pollution (sulfur dioxide, SO ₂ ; nitrogen oxides, NO _x ; volatile organic compounds, VOCs) Fishing and hunting quotas
Taxes or charges on pollution or resource use	Water effluents Water abstraction or consumption Forest stumping charges Air pollution emissions
Taxes or charges on a proxy (input or output)	Fuel use (by fuel type) Motor vehicles Fertilisers
Baseline-and-credit permit systems	Clean development mechanism Lead content of gasoline
Subsidies and other direct support	Support for purchase of environmentally friendly equipment, insulation or energy-efficiency investments, etc.
Deposit-refund systems	Beverage and chemical containers Lead acid batteries
Removal of environmentally harmful subsidies	Fossil fuel subsidies Fisheries Agriculture
<i>Regulation</i>	
Good regulatory practice	Removing regulatory barriers (e.g., for the production and use of green hydrogen) Addressing gaps and overlaps in regulation Assessing environmental impacts of regulation (e.g., regulatory impact assessments)
Standards	Limits on emissions of passenger and freight vehicles Energy efficiency standards for various manufactured goods Renewable energy portfolio standards (e.g., coupled with green certificates) Resource recovery and reuse Minimum percentage of a low-carbon source in the overall fuel mix of vehicles (e.g., biofuels) or electricity (e.g., renewable energy) Specific housing building codes for energy-saving purposes
Information provision	Publicly available inventories of various pollutants Labelling schemes (e.g., energy efficiency) Climate-impact disclosure Other instruments aimed at nudging consumers into more environmentally friendly decisions Environmental education and awareness policies Promotion of sustainable practices (e.g., in agriculture, forestry)
<i>Complementary enabling instruments</i>	
Innovation	Public investment in green technology
Investment	Green financial instruments
Procurement	Public procurement of green products
Capacity building	Public sector skills for effective green policies Private sector skills for new and greener industries
Green industrial policy	Foster green technologies Stimulate new industries
International cooperation	Use of international standards, guides and recommendations Regulatory cooperation and alignments

Source: Adapted from Lütkenhorst et al. (2014) and OECD et al. (2012).

Pricing should be a central element of the policy mix ...

Market instruments that directly assign an explicit value to environmental externalities are likely to form the core of any suite of green policy measures. The pricing system should be designed to cause minimum distortion, cover appropriate time frames and have low administrative costs and effective enforcement mechanisms (OECD 2009b). Price mechanisms are also an efficient way to raise revenue; the funds could be used, for example, to compensate those adversely affected by green reforms or offset other taxes.

However, pricing alone is unlikely to be sufficient, because under certain conditions pricing would be difficult to implement or the price signal may be weak. In addition, although pricing can address the gap between the private and social costs of externalities, there may be other market failures, market imperfections or government failures that constrain green growth. Complementary policy approaches are also likely to be needed. Non-market instruments, including R&D subsidies, performance standards or communication campaigns can be appropriate when pricing is not sharp enough to trigger the required changes in investment patterns, behaviours and technologies (Fay et al. 2015).

... and needs to be embedded into the wider structural policy agenda

Green structural reforms that ensure the effective functioning of environmental markets are critical to the success of green policy packages. Market-based green policy tools such as price signals need well-functioning labour, product and financial markets in order to provide incentives for reducing externalities and to spur innovation and investment in greener activities.

Broad structural reform policies that promote competition and flexible product and labour markets and a policy milieu that incentivises innovation and stimulates investment provide the essential framework conditions for the successful implementation of green policy tools (see Table C.4, Appendix C).

However, there can be barriers to the implementation of pricing policies that need to be addressed by sequencing supporting policies and so lead up to the introduction of pricing (see Table C.5, Appendix C).

Table C.4 Examples of structural policy instruments to support green recovery

Instrument	Examples of applications
Competition policies	Reducing barriers to entry and exit and administrative burdens Improving enforcement of competition rules and ensuring level playing field Adequate definition and enforcement of property rights
Tax reform	Shifting tax burden away from income to other taxation (in particular, environmental taxation)
Labour market policies	Improving labour market flexibility and mobility Preserving workers' rights Reducing skill mismatches (education, training) Adequate active labour market policies Improving social safety nets
Product market policies	Improve the working of product markets Spur innovation and investment in cleaner activities
Investment policies	Better business climate for (private) investment Removing barriers to foreign direct investment (FDI) Facilitating access to financing and removing regulatory barriers to the financing of long-term infrastructure investments Public investment in green infrastructure or restoration of degraded landscapes Investment in infrastructure to support access to basic services (e.g., water supply and sanitation, green energy, public transport)
Network sector policies	Regulatory reform Improving competition in the market segments of network sectors, especially if accompanied by appropriate regulation Road pricing or congestion charges to manage demand Replacement of consumption subsidies with connection subsidies Improving incentives for investment in network segments (e.g., facilitating the appropriation of benefits through cost-recovery pricing) Improved urban planning, including adequate provision of public transport
Innovation	Public support to basic research Adequate protection of intellectual property rights and conditions and mechanisms for technology transfer More competition, more flexible product and labour markets Lower barriers to trade and FDI
Public sector governance	Capability and capacity Accountability mechanisms

Source: Adapted from OECD et al. (2012).

Table C.5 Sequencing options to overcome barriers in pricing policy

Barrier	Sequencing options
<i>Cost</i>	
High technology costs	Drive down technology costs through dedicated green technology (industrial) policies
Lack of policy cost-effectiveness	Phase in more cost-effective policies: <ul style="list-style-type: none"> • Phase out technology policies once technologies are mature, such as through a sunset clause • Infuse regulation with incentives, ultimately reaching carbon pricing (first-best) • Increase sectoral coverage of policies
<i>Distributional dynamics</i>	
Opposition by regulated interest groups	Use targeted exemptions and compensation to get consent, such as grandfathering of certificates Employ sectoral differentiation, such as policies with lower stringency (or more compensation) in sectors with higher political opposition
Lack of supportive coalition	Prioritise policies (e.g., green industrial policies) that expand supportive populations and constituencies. Counteract regressive effects with complementary policies and programmes
<i>Institutions and governance</i>	
Lack of expertise and capacity	Build on existing agencies and policy tools doing related work to set up new climate policies Draw on related policy domains or other jurisdictions in designing policies
Long-term versus short-term interests	Create new institutions that are politically insulated or otherwise able to focus on long-term outcomes Implement policies that are resistant to rollbacks (e.g., through creation of property rights) and ensure credible long-term political commitments Codify regulatory actions through legislation, that is, make them legally binding
Veto points	Select initial policy options that face reduced veto points and that can also build political support to overcome more stringent veto points in the future
Public participation	Allow for public notice and comment; hold public hearings for major decisions Allow for judicial review of agency decisions to ensure that public voices are appropriately recognised
<i>Free-riding</i>	
Free-riding and lack of international institutions	Develop an international climate framework. Build climate coalitions: <ul style="list-style-type: none"> • Link policies with similar-minded jurisdictions • Use of transfers to provide compensation for jurisdictions reluctant to join
Change choices and preferences of other jurisdictions	Take advantage of ‘reverse leakage’ <ul style="list-style-type: none"> • Leverage economic interconnections (e.g., markets) to diffuse clean technologies • Leverage political interconnections (e.g., federal system) to diffuse policies, standards and norms

Source: Pahle et al. (2017).

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