

CLIMATE POLICIES IN LATIN AMERICA AND THE CARIBBEAN

Success Stories and Challenges in
the Fight Against Climate Change



Mauricio Cárdenas
Juan Pablo Bonilla
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**Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library**

Cárdenas S., Mauricio (Cárdenas Santa-María).

Climate policies in Latin America and the Caribbean: success stories and challenges in the fight against climate change /

Mauricio Cárdenas, Juan Pablo Bonilla, Federico Brusa.

p. cm. — (IDB Monograph ; 929)

Includes bibliographic references.

1. Climate change mitigation-Latin America. 2. Climate change mitigation-Caribbean Area. 3. Climatic changes-Government policy-Latin America. 4. Climatic changes-Government policy-Caribbean Area. 5. Environmental policy-Latin America. 6. Environmental policy-Caribbean Area. 7. Carbon dioxide mitigation-Latin America. 8. Carbon dioxide mitigation-Caribbean Area. I. Bonilla, Juan Pablo. II. Brusa, Federico. III. Inter-American Development Bank. Climate Change and Sustainable Development Sector. IV. Title. V. Series.

IDB-MG-929

KEYWORDS

Climate Change, Climate Policy, Sustainable Development, Decarbonization, Sustainable Recovery, Latin America, Climate Crisis, Fiscal Instruments, Green Recovery

JEL CODES

O10, O13, O16, O18, O19, O20, O23, O38, O54, Q01, Q28, Q50, Q56, Q58



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ACKNOWLEDGEMENTS

This publication was written by Mauricio Cárdenas, Juan Pablo Bonilla, and Federico Brusa with outstanding research contributions from Juan David Torres, Catalina Aguiar, Daniella Restrepo, and Sergio Moreno all provided invaluable inputs and support. The document was edited by Rita Funaro. A translation into Spanish was done by David Haskel.

The work benefited from extensive reviews by Graham Watkins as well as by two anonymous reviewers from Columbia University's Center on Global Energy Policy. This work also benefited from extensive discussions and the feedback of Luis Alejos Marroquín, Hilen Meirovich, Lorena Palomo, Cristian Salas, and Paula Suarez Buitrón.

The authors would also like to acknowledge the guidance and support of: Gerard Alleng, Amal Lee Amin, Allen Blackman, Barbara Brakarz, Marcelo Caffera, Mariana Ceva Alvarez, Ana Cuesta, Alfonso de Alba, Raúl Delgado, Jennifer Doherty-Bigara, Maricarmen Esquivel, Jaime Fernandez-Baca, Agustín Furstenberg, Juan Carlos Gómez Sandoval, Alfred Grunwaldt, Grace Guinand, Marcela Jaramillo Gil, Benoit Lefebvre, Aloisio Lopes Pereira, Isabella Marinho, Bruno Melillo, Gmelina Ramirez, María Cecilia Ramirez, Cristina Rodríguez, Rodrigo Rojo, Omar Samayoa, José Manuel Sandoval, Rilla Sanchez-Greer, Carlos Scartascini, Ernesto Stein, Luis Martín Uribe, and Adrien Vogt-Schilb.

THIS PUBLICATION WAS FUNDED BY THE IDB SECCI MULTI-DONOR FUND (SPAIN, GERMANY, ITALY, FINLAND, SWITZERLAND, UNITED KINGDOM, AND JAPAN) THROUGH TECHNICAL COOPERATION RG-T3482. MAURICIO CÁRDENAS' CONTRIBUTION TO THE PROJECT WAS FUNDED BY THE CENTER ON GLOBAL ENERGY POLICY AT COLUMBIA UNIVERSITY.



TABLE OF CONTENTS

- Preface 8**
- Executive Summary 10**

- CHAPTER 1.**
- Policy Limitations in the Face of the Climate Crisis 14**
 - In the Beginning..... 16
 - Modeling Anthropogenic Climate Change 18
 - The Price of Inaction 24

- CHAPTER 2.**
- In the Eye of the Storm 28**
 - Climate Vulnerability in Latin America and the Caribbean..... 30
 - Poised for a Direct Hit: The Region’s Most Vulnerable Sectors..... 35
 - Agriculture: A Vulnerable Growth Engine 35
 - Water: The Principal Preoccupation for Equitable, Sustainable Development..... 39
 - Energy: Leveraging the Region’s Renewable Endowments 40
 - Health: A Manifestation of Multidimensional Climate-Driven Risks 41
 - The Economics of Climate Change..... 42
 - Finance Ministers for Climate Action 42
 - The Case for Finance Ministry Intervention in Adaptation Policy..... 43
 - From Adaptation Policy to Paris-Aligned Sustainable Development Pathways 45

- CHAPTER 3.**
- The Response to Climate Change 48**
 - Harnessing the Wind: Sustainable Development Goals (SDGs) and the Climate Opportunity..... 50
 - Integrating Agendas: The Experience of Barbados 51
 - Integrating Agendas: Effective Mainstreaming in Colombia..... 54
 - The Second Round of Nationally Determined Contributions (NDCs) 56
 - Costa Rica: An All-in Approach to Protect the Environment..... 58
 - Chile: Linking Environmental and Socioeconomic Policy..... 59

CHAPTER 4.

Decarbonization Strategies: Linking Environmental and Socioeconomic Concerns 62

- On Decarbonization in Latin America and the Caribbean..... 64
- Critical Sectors for Mitigation 65
- Rethinking the Region’s Clean Energy Matrix67
- Agriculture, Forestry, and Land Use: Small in Scale, Big on Impact71

CHAPTER 5.

Fiscal Instruments for Decarbonization..... 78

- Addressing Carbon as a Negative Externality..... 80
- Emission Trading Schemes and the Kyoto Protocol: A Regional Approach 81
- Carbon Taxes in Latin America 83
- Effects of Carbon Taxes:
Are They Worth the Trouble? 85
- Compensation Counts: Dealing with the Obstacles to Carbon Taxation87

CHAPTER 6.

Renewable Energy: A Chance for the Region to Shine 92

- Plenty of Potential in Renewable Energy..... 94
- Costs and Complementarities 98
- The Role of Government101

CHAPTER 7.

Driving Down Emissions in Urban Transport 104

- Transportation: A Key Sector for Intervention106
 - Electric Vehicles: On a Long and Winding Road107
 - Supporting the EV Transition110
- Bus-Rapid-Transit (BRT) Systems and Electric Buses:
Latin America and the Caribbean as a Global Leader 111
 - The Next Step: Electrification of BRTs 113

CHAPTER 8.

Developing Green Financial Markets..... 116

- The Case for Sustainable Investment..... 118
 - Traditional Instruments 118
 - A New Wave of Resource Mobilization Options120
- International Efforts to Encourage Sustainable Investment.....123
- Sustainable Finance in Latin America and the Caribbean125
 - SDG-Linked Bonds125
 - Green Bonds126
- Room to Grow128

CHAPTER 9.

Towards a Green Post-Covid-19 Recovery	130
Another Lost Decade? A Proper Response to the Covid Challenge.....	132
Is a Green Recovery Feasible in Latin America?.....	133
Do-No-Harm Policies: The Case of Stranded Assets.....	135
Opportunities for Green Investments during the Recovery	136
Creating More Fiscal Space:	
Debt-for-Nature Swaps and Other Solutions	137
Mainstreaming Biodiversity in Policy at the Local Level	137
Changes in Regulatory Standards	139
All Politics is Local: Subnational Governments and the Recovery	140

CHAPTER 10.

The Politics of Climate: Focus on the Middle Class	142
A Strong Political Constituency: The Middle Class	144
Middle Class Policy Preferences.....	146
Weathering the Region's Challenges	150

Annexes **153**

ANNEX I Environmental Policy: A Historical Perspective	154
ANNEX II Beyond Paris: Integrating the Climate, Biodiversity, and Natural Disaster Agendas	161

References..... **163**

PREFACE

This work is aimed at nontraditional climate policy actors such as the finance and planning ministries of Latin America and the Caribbean. The objective is to provide a glimpse into the existing, limited, regional examples of how effective climate policy may be achieved while also contributing to sustainable economic and social development.

The objectives of this work are multiple: (i) identify regional, tested, growth-spurring policy options that also contribute to sustainable development; (ii) present public and private financial solutions that may enable a just transition; (iii) offer considerations on regionally relevant green recovery packages; (iv) frame these elements within the existing regional political economy—a necessary condition for effective implementation; and (v) identify existing knowledge gaps while suggesting research avenues to further support the adoption of relevant measures.

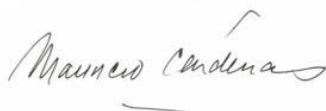
As the region, The Latin American and Caribbean region is highly vulnerable to climate change. Historically, the region has adopted an “adaptation first” posture. The region’s early adoption and implementation of the Paris Agreement’s Nationally Determined Contribution (NDC) framework also led to some ambitious decarbonization plans, as well as to considerable advances in the energy and transportation sectors. As countries submit the second iteration of their NDCs, some coordinated whole-of-government approaches emerge. Notwithstanding some positive signs, plenty remains to be done in sectors such as agriculture. From an implementation perspective, the challenge remains the same: to transform ambitious objectives into measurable results. Finance and planning ministries have a critical role to play, in coordination with environmental ministries, to support the full mainstreaming of climate policy and deliver Paris-aligned budgets and project pipelines.

If Latin American and Caribbean countries are to successfully deliver on their Paris Agreement objectives, governments must coordinate national development planning, budget allocation, and NDC design. An effective whole-of-government approach demands stronger participation by finance ministries as well as planning and budgetary entities, as evidenced by some regional examples. Mainstreaming climate change implies a shift: climate policy should no longer be considered a purely environmental concern. Rather, sustainable policy responses must be embedded in all existing government actions. While economists have long focused exclusively on the pricing of carbon, climate change is already manifesting itself through direct

negative fiscal impacts, which must be accounted for. In that sense, as in the case of stranded assets, the inclusion of climate policy under IMF Article IV consultations sends a strong signal that finance ministers must heed.

With constrained budgetary space and the specter of another lost decade in the region looming, this time due to the coronavirus pandemic, public spending must be optimized; non-resilient infrastructure spending becomes wasteful. Returns on investment, both economic and social, must be guaranteed. Developing local green and sustainable finance markets is also critical to attract more interesting financial solutions.

Economic crises often open opportunity windows. Relevant green recovery programs such as the European Green Deal or the United States' climate change as well as its jobs and economic recovery initiatives have yet to be implemented but are worthy of consideration. Ultimately, the political and economic constraints of the region will determine the type of policy solutions to the pandemic, but if they are not driven by environmental sustainability concerns, their effect will be limited at best. As governors of international financial institutions (IFIs) like the Inter-American Development Bank (IDB) engage in discussions for a capital increase, they also consider the role IFIs can play in furthering environmentally sustainable growth policies.



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EXECUTIVE SUMMARY

After a decade of rapid economic and social progress, Latin America is facing mounting pressures. Per capita economic growth has declined since 2013 while social tensions are on the rise, encouraging many young Latin Americans to take to the streets. Towards the end of 2019, massive protests erupted in Santiago, Bogotá, La Paz, and Quito, among other cities. If not properly addressed, the social and economic consequences of the coronavirus disease (Covid-19 or Covid) outbreak will only fuel the prevailing levels of dissatisfaction. Economists are already warning of the debt pandemic. Latin America and the Caribbean is at a critical juncture. Mismanaging the current crisis could lead not only to another lost decade but to acute political turmoil. On the other hand, sound, resilient policy interventions could steer the region towards effective sustainable development.

At this critical socioeconomic and political moment, climate change represents a formidable challenge. The world will face catastrophic and irreversible heating unless governments and citizens shift their priorities soon. While the Paris Agreement's objective aims to limit global warming to well below 2.0°C, preferably to 1.5°C, compared to pre-industrial levels, most countries in Latin America and the Caribbean have signed a commitment to strive for the more ambitious target.¹ Indeed, according to the UN Intergovernmental Panel on Climate Change (IPCC), warming should be limited to 1.5°C above pre-industrial levels or risk increasingly worse economic and social consequences. Current warming has already exceeded 1.0°C and the specter of increased climate variability presents an additional stressor for countries and communities unable to cope with current climate variations.

Climate change—and specifically climate risk and a perceived lack of action on this front—is a source of unrest. Increasingly frequent extreme weather events have a disproportionately large impact on the poor, compounding general levels of dissatisfaction. Many accuse governments of not doing enough and demand more action. More efficient, clean public transportation—and more broadly cleaner air—are part of a long list of demands that include other more politicized issues, such as a ban on fracking. Just transition measures are, however, possible. Global comparative surveys show that the region's growing middle class is particularly committed to environmental policy solutions.

More broadly, climate change is playing a larger role in today's national conversations. The issue is at the forefront of Chile's new constitutional assembly, Brazil's policies in the Amazon, citizens' complaints about air quality in cities across the region, and efforts to develop renewable energy in the Caribbean and Central America, which have traditionally been dependent on fossil fuels.

Climate risks also have an indirect impact on variables that are a source of anxiety in Latin America, where the majority of the population now belongs to the so-called vulnerable class (i.e., the socioeconomic group between the poor and the consolidated middle class). Natural disasters or shocks to energy prices can push these people and their families back into poverty. Efforts to reduce carbon emissions also raise concern. For example, coal miners, especially in small scale units of production, fear for their economic future. Signaling these threats to sustainability, the IMF now includes a country's climate policies as part of its crucial Article IV consultations.

1 Article 2 of the Paris Agreement, subsection (a) states that an objective includes "Holding the increase in the global average temperature to well below 2.0°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." (Paris Agreement to the United Nations Framework Convention on Climate Change, 2015, p.3)

While climate change clearly poses serious threats, it also offers opportunities associated with the need to build resilient infrastructure and housing, as well as to develop renewable sources of energy.

Information and analysis of what Latin American countries are doing to address these issues are diffuse, at best. Clearly, the need is to evaluate positive experiences in some areas and lessons learned in others, to lay out additional steps the region needs to take. The purpose of this paper is to take stock of the current situation in Latin America and provide input on how to effectively address the climate emergency with low-cost, high-impact responses.

Climate policies in Latin America and the Caribbean must be discussed in the context of democratic governance. Thus, decisions must be part of a process that involves different actors and often requires majority building in legislative bodies. In some cases, the judiciary has been proactive in addressing issues related to climate change. Although common, the judicialization of climate decisions is not always a good substitute for inaction in the executive and legislative branches.

Climate policies must also be considered in the context of Latin America's high levels of poverty and inequality. They must be consistent with the goal of finding a solution to these pervasive problems rather than worsening them. The Covid-19 recession is another element to factor in. Climate policies need to be consistent with a robust economic recovery.

This document reviews general trends in climate policy in the region. The analysis focuses on the experiences of a group of countries that capture the essence of the debate in the region. However, a word of caution is needed: Latin America and the Caribbean is a very diverse region, meaning individual countries' experiences cannot be generalized. The way private and public actors interact, the role of national and subnational governments, the policy options available, and the interplay between science and politics are country specific.

The paper tries to avoid making one-size-fits-all policy recommendations. It does, however, provide some general guidelines as to what has worked and what has not and focuses on the steps to consider in future policy.



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CHAPTER 1

POLICY LIMITATIONS IN THE FACE OF THE CLIMATE CRISIS

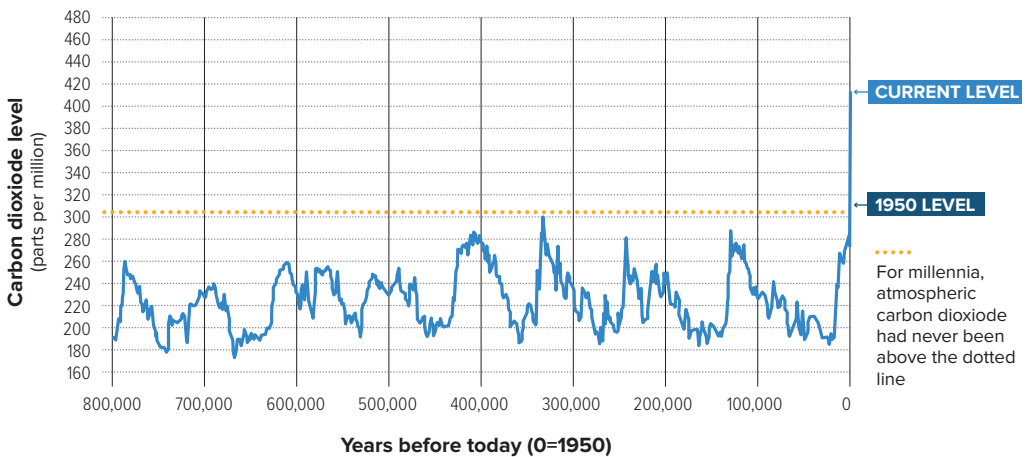
Climate policy is built on a lengthy body of solid scientific evidence. This chapter offers a non-exhaustive review of climate science, its origins, and its evolution to the complex multidisciplinary body of knowledge into which it has grown. It highlights its frontiers and current limitations to make the case for adopting more robust policymaking instruments that factor in uncertainty.

IN THE BEGINNING...

The understanding of how human activity impacts atmospheric greenhouse gas (GHG) concentrations that cause anthropogenic climate change has a long history, beginning when Horace-Bénédict de Saussure (1779) observed colder temperatures in mountains. Complementing Saussure’s scientific experiments, French mathematician Jean Baptiste Fourier laid the scientific cornerstone that describes the greenhouse effect in 1824 (Fourier, 1824). This work was completed by Swedish scientist Svante Arrhenius in 1896, who determined the role of GHG in temperature variation between glacial and inter-glacial periods (Arrhenius, 1897).

Observations on human-induced variations in global average temperatures continued in the 20th century. Work in 1931 by E.O. Hulburt at the United States Naval Research Laboratory provided empirical evidence confirming the link between CO₂ atmospheric concentration and average sea level temperature increases while calculating the dangerous effect of a doubling in CO₂ emissions (Hulburt, 1931). In 1958, Charles David Keeling started measuring atmospheric CO₂ levels, discovering alarming yearly increases. One of his main findings was that CO₂ concentration levels had not varied —apart from seasonal patterns— by more than 1% for millions of years until the mid-19th century, when humans started burning considerable amounts of fossil fuels to generate energy (see Figure 1.1).

FIGURE 1.1. Keeling Curve and Vostok Ice Core Data reveal the incidence of anthropogenic activity on the carbon cycle



SOURCE: Reprinted from *Graphic The Relentless Rise of Carbon Dioxide*, by NASA Global Climate Change, (n.d.-a.), https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/

While the existence of external anthropogenic forces that cause massive changes in the Earth's systems is relatively recent, historical climatology teaches that it is not the first time humans have faced extreme weather events. History provides numerous examples of failures to adapt to changes in weather patterns which, in extreme cases, led to the collapse of entire civilizations.

Peter Demenocal (2001) documents the collapse of the Akkadian Empire (circa 4200 calendar year BP) during the late Holocene.² Kathayat et al. (2017) show how variations in the Indian summer monsoon affected sociopolitical configurations on the Indian subcontinent and led to the fall of Harappa and the decline of the Indus Valley civilization. Notably, the only Bronze Age civilization that successfully adapted to changing climate patterns is the Egyptian empire. In contrast to what happened to the Hittite empire, ancient Egyptians under Ramses II planned and adopted new crops and farming practices that allowed the empire to survive after a series of droughts from the second half of the 13th century B.C.E. (approximately 3200 years BP) through the end of the 12th century B.C.E. (Finkelstein et al., 2017).

In Latin America, the failure to understand and adapt to changing climate patterns of the Holocene most likely played a critical role in the demise of the Classic Maya, Tiwanaku, and Mochica empires (Demenocal, 2001). Closer to the current Anthropocene geological era and more relevant is the example of Angkor, capital of the Khmer Empire in the 14th and 15th centuries. Buckley et al. (2010) provide scientific evidence of how a civilization that had sufficient planning and engineering skills to adapt to both droughts and high monsoon years—and that built the “hydraulic city of Angkor”—failed. The adaptive measures they implemented were not enough to withstand the variability in the strength and intensity of the monsoon for time periods of years to decades. In fact, climate forces likely exacerbated an already weakened governance system, which led to the demise of the incredible urban complex of Greater Angkor and its kingdom.

2 BP is used to measure time “before present” and is often used by archaeologists, geologists, and other scientists to measure time by adopting a radiocarbon aging referential. Present Time is defined as 1950, the closest date to the deployment and use of radiometric dating.

MODELING ANTHROPOGENIC CLIMATE CHANGE

Anthropogenic climate change poses even direr challenges relative to those confronted in the past. The Earth system is already dealing with the physical and economic consequences of a mean warming of 1.0°C. In a business-as-usual growth model, a mean temperature increase of 1.5°C—which is likely to happen soon—will exacerbate the consequences of climate change with disruptive effects on ecosystems; beyond 2.0°C, complex negative compound interactions between different Earth systems will begin to increase in frequency and magnitude. Between 1.5°C and 2.0°C, the Intergovernmental Panel on Climate Change (IPCC) notes substantially increased exposure to multiple, compound climate-related risks.³ An overshoot will result in compound climate risks driven by cascading tipping points, most of which are too complex to accurately integrate into existing models (see Figure 1.2).⁴ These dynamics occur within the more complex Earth system in which anthropogenic climate change is only one factor of environmental and socioeconomic risk (see Figure 1.3).

Climate models have improved in recent decades and past models have correctly predicted many of the observed consequences of climate change. However, these models have failed to fully grasp the physical, human, and economic threats (Schmidt, 2007; Hausfather et al., 2020). Climate science has made substantial leaps and continues to do so. However, policymakers must act now with the current available science and, most importantly, with considerable uncertainty over both the magnitude of the consequences and the policy environment in which they must operate.

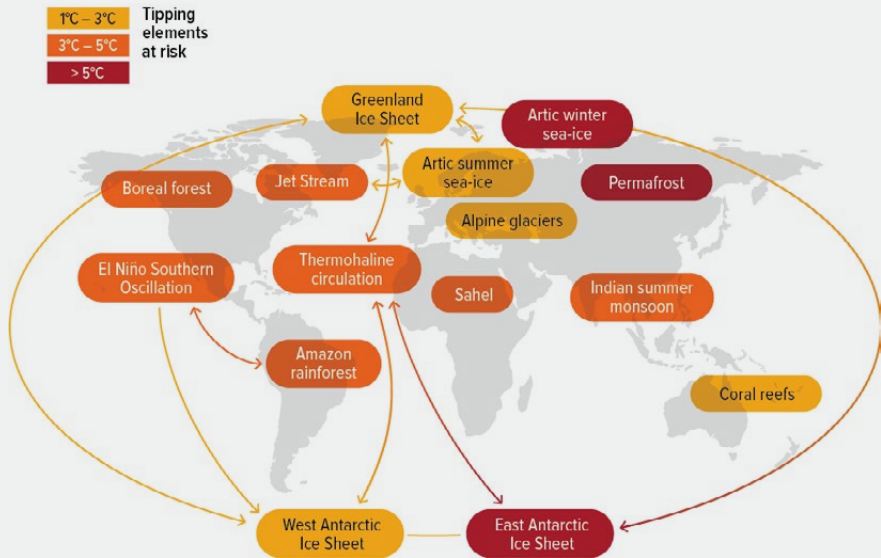
To achieve some common understanding, the United Nations (UN) created the Intergovernmental Panel on Climate Change (IPCC) as a scientific body with the mandate to provide governments the needed scientific information for developing climate policies. In an open and transparent review process, academic experts from the IPCC's 195 country members review and prepare the information to comply with its mandate. The IPCC plays a critical role by helping policymakers understand viable options and by identifying the most robust scientific and empiric evidence from academia.

However, IPCC predictions may underestimate the physical, human, and economic consequences of climate change (DeFries et al., 2019). Therefore, they offer a reasonable scientific foundation for policymakers, but should

-
- 3** Temperature increase projections are measured in contrast to pre-industrial age levels, using 19th century global average temperatures.
 - 4** A tipping point is defined as a threshold beyond which systemic change occurs. Lenton et al. (2008) define, by extension, a tipping element as a large-scale component of the Earth system that may pass a tipping point. Self-reinforcing feedback in the carbon cycle could, however, result in a cascading set of tipping points. When taken to the extreme, these cascading tipping points could transform our planet until a hypothetical hothouse Earth scenario is reached. Hothouse Earth is characterized by a runaway greenhouse gas effect, such as on Venus. The IPCC states that this extreme scenario has virtually no chance of being induced by anthropogenic activities alone. However, the consequences of cascading tipping points can be serious enough to affect socioeconomic developments in ways not fully understood.

FIGURE 1.2.

Global Map of Tipping Cascades

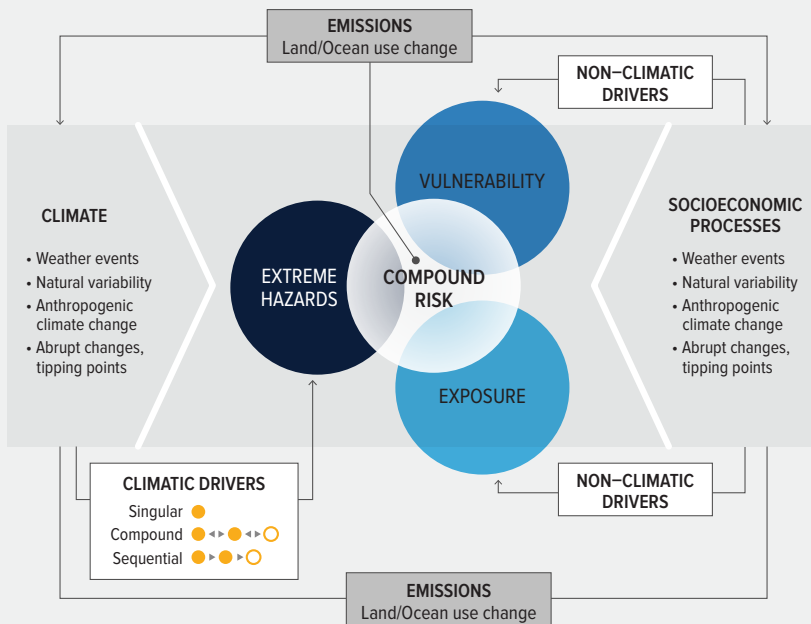


SOURCE: Reprinted from *Trajectories of the Earth System in the Anthropocene*, by Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., Summerhayes, C. P., Barnosky, A. D., Cornell, S. E., & Crucifix, M., 2018, *Proceedings of the National Academy of Sciences*, 115(33), p. 8255. CC-BY-NC-ND-4.0.

NOTES: The individual tipping elements are color-coded according to estimated thresholds in global average surface temperature. Arrows show the potential interactions among the tipping elements based on expert elicitation that could generate cascades.

FIGURE 1.3.

Compound Risk and Cascading Impact Framework



SOURCE: Reprinted from *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, by IPCC, 2019, <https://www.ipcc.ch/srocc/>. Copyright © 2019 Intergovernmental Panel on Climate Change

be considered a best-case scenario. Nonetheless, even these optimistic predictions present a strong case for climate action (Cai et al., 2016).

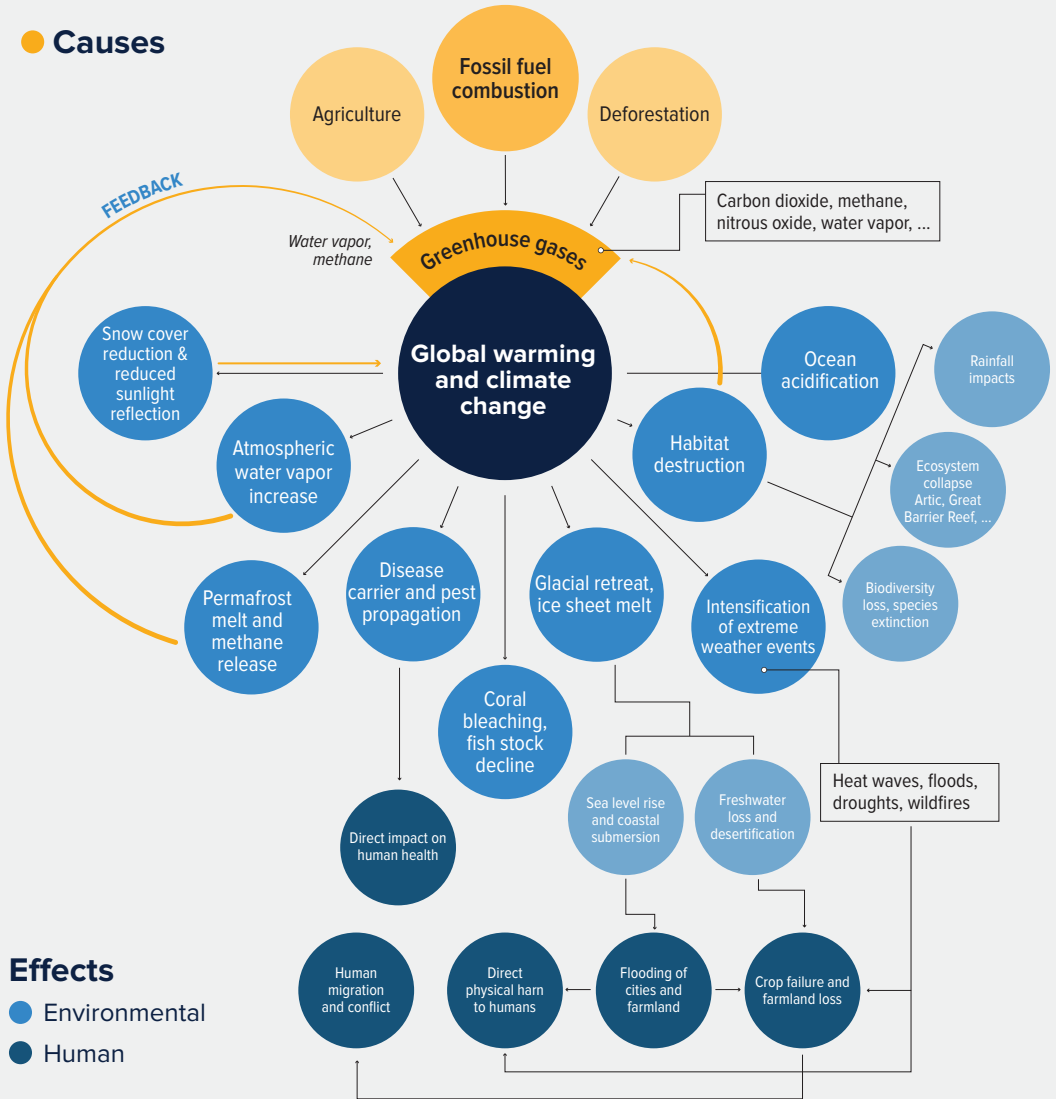
Defries et al. (2019) consider three types of physical processes that existing models fail to account for and that together underrepresent the consequences of warming above 1.5°C. A first set of elements are structural limitations to existing climate modeling capacities, beginning with the existing limitations of climate science. Indeed, there are “known-unknowns” in the field of climate science, which is constrained by the outer boundaries of the existing body of scientific knowledge. This is particularly important as higher emissions in the atmosphere, or anthropogenic (external) climate forcing, increases positive climate change feedbacks whose wide-ranging effects become too complex for policymakers to fully grasp in the limited time required to achieve the objective of net-zero emissions. As the climate changes, interactions occur between different Earth systems that are typically understood individually. Unfortunately, the knowledge or capacity to predict the consequences of interactions between these systems in a changing climate are still limited. Climate modeling is, thus, a necessary but insufficient policymaking instrument. Models are also limited by their capacity to fully consider compound effects. For example, modeling the consequences of several climate-induced drought years becomes increasingly complex and difficult. Droughts affect local populations by threatening their food security, but also push them into poverty, migration, and violence. In turn, migratory movements exert stress on recipient locations, which may also be under climate stress. Connecting these effects with weakened governance and fiscal outcomes adds another dimension of complexity, particularly for policymakers who rely on oversimplistic models for decision-making (see Figure 1.4). Predicting the economic costs of climate change using simple general equilibrium models, for instance, leaves out many relevant dimensions that hide severe economic consequences. Today, lower computational power costs and advances in policy instruments such as RAND’s XLRM framework for robust decision-making (RDM) provide more useful solutions for economic policymakers (Lempert et al., 2006).⁵

A second set of elements underrepresented in current models includes processes whose impact and occurrence are not entirely understood such as: (i) ice sheet and ice shelf hydrology and dynamics; (ii) severe storms and floods, including tornados, tropical cyclones, and heavy rainfall events; (iii) coastal erosion and its impacts on infrastructure; (iv) cascading ecosystem losses; (v) feedback loops that accelerate climate change, including permafrost thaw and forest die-off; and (vi) extreme heatwaves, droughts, and associated wildfires.

5 Robust Decision-Making is a policymaking instrument developed by RAND that involves a rigorous combination of scenario planning with powerful computing to support decision-makers by helping to (i) identify potential strategies robust to future unknowns; (ii) characterize the vulnerabilities of such strategies; and (iii) evaluate tradeoffs among alternatives.

FIGURE 1.4.
Global Warming and Climate Change Causes and Effects

Causes



Effects

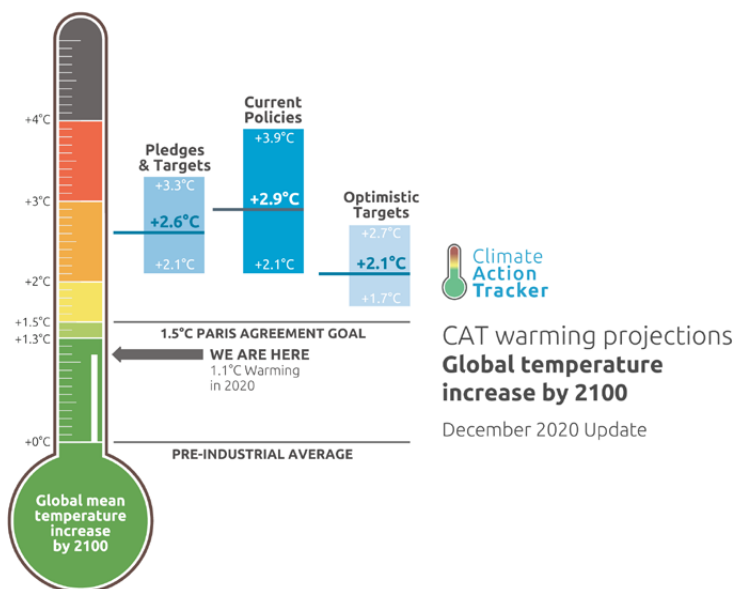
- Environmental
- Human

SOURCES: Data from NASA Global Climate Change (n.d.-b); NASA Global Climate Change (n.d.-c); IPCC (2019); USGCRP (2017)

Finally, a third set of elements are processes that are identified and generally understood, but are not accurately represented in existing models including: (i) political responses, such as the effects of economic trade and integration policies and their impact on food security and prices (Nelson et al., 2014); (ii) adaptation responses; (iii) responses to extreme events such as food shocks and destruction of assets; (iv) health and labor productivity impacts from climate change, including extreme events such as wildfires and disease outbreaks and their interactions with air pollution (Watts et al., 2018); and, (v) the determinants of agricultural productivity, and the consequences of climate on prices and consumption demand.

According to the Climate Action Tracker, current business-as-usual policies can result in an increase of up to 4.1°C in average global temperature (see Figure 1.5).⁶ In contrast, the Paris Agreement's central aim is to hold "the increase in the global average temperature to well below 2.0°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C." (Paris Agreement to the United Nations Framework Convention on Climate Change, 2015) Unfortunately, if pledges and targets submitted by

FIGURE 1.5.
Climate Action Tracker: Current NDC Commitments Are Insufficient



SOURCE: Reprinted from *Global update: Paris Agreement Turning Point*, by Climate Analytics & New Climate Institute, 2020a, Climate Action Tracker, <https://climateactiontracker.org/publications/global-update-paris-agreement-turning-point/>. Copyright © 2009-2021 by Climate Analytics and NewClimate Institute.

6 The Climate Action Tracker is an independent scientific analysis that tracks government action and measures it against the globally agreed Paris Agreement objectives. It tracks 36 countries and the EU, representing around 80% of global GHG emissions.

countries under the Paris Agreement's NDC regime remain as they are, the temperature of the planet is expected to increase 3.5°C, far beyond the capacity of most nations to manage the consequences. As countries submit new versions of their NDCs, as stated in the so-called "ambition mechanism" of the Paris Agreement, it becomes critical that these not only reflect stronger temperature targets but, most importantly, an effective implementation mechanism to deliver on these targets.

The key point is that beyond certain temperature increase thresholds, it becomes increasingly difficult to effectively monetize and quantify the economic consequences of climate change. Beyond 3.0°C, estimates of what William Nordhaus defines as the damage functions in the DICE model are virtually nonexistent (Nordhaus & Sztorc, 2013) and the models themselves become unreliable because their built-in assumptions underrepresent the consequences of climate on growth, damage, and risk.⁷ Keen (2020) claims that the Nordhaus damage function takes an overly optimistic approach to existing climate science; therefore, a substantial part of economic activity (about 90% of GDP) is totally shielded from climate impacts in the model, while scientific and empirical evidence demonstrate otherwise. Given economic growth, climate events are seen only as specific, limited disturbances. Dietz and Stern (2015) look in detail at why most integrated assessment models (IAMs) are limited instruments in the case of climate policy. Finally, Lenton and Ciscar (2013) highlight the disconnect between existing scientific knowledge on tipping points and the failure of IAMs to fully reflect and represent these changes.

7 The Dynamic Integrated Climate-Economy Model developed by W. Nordhaus is an integrated assessment model that attempts to integrate economics, carbon cycle, as well as climate science and impacts.

THE PRICE OF INACTION

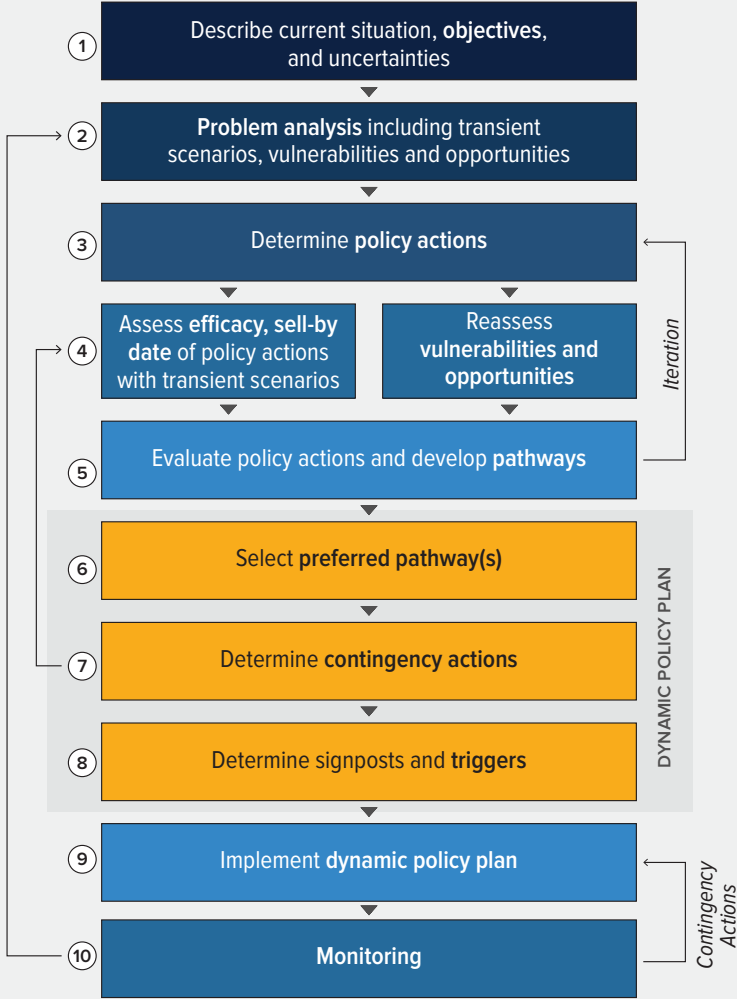
Climate vulnerability is a useful concept to assess the danger posed by climate change in three areas: (i) exposure to risk; (ii) sensitivity to risk; and (iii) adaptive capacity. While climate exposure refers to those human and physical assets threatened by extreme weather events, sensitivity refers to the magnitude of the impact. Adaptive capacity is defined by the systems needed to manage exposure and reduce impact, including data generation, evidence-based policy formulation, and coordinated delivery mechanisms, often characterized by complex multi-level and multi-sectoral governance frameworks. Further complicating adaptation policy is an ever-evolving set of geophysical parameters.

While models in themselves may be limited, the consequences of cascading effects and tipping points can be illustrated with some concrete examples. Using a model, Sampaio et al. (2007) concluded that if the Amazon forest were to lose 40% of its landmass to deforestation, climate change and widespread use of fire would convert the eastern, southern, and central parts of the Amazon into savanna-type landscapes in short order. The model also shows that the same outcome is possible if between 20% and 40% of the forest is lost, or if warming exceeds 4.0°C. Lovejoy and Nobre (2018) believe that recent extreme droughts in the Amazon region probably reflect the onset of an early tipping point and recommend building a margin of safety against it. To verify modeled scenarios, they find that predictions are in line with history; over the past 60 years, almost 20% of the Amazon rainforest has been lost and regional warming has reached 1.0°C.

One of the biggest problems with these dynamics is linked to extrapolation bias, also known as recency bias, mistakes. In behavioral economics and finance, extrapolation bias refers to the tendency to overweight recent events when making decisions about the future. Indeed, following traditional best-case policy procedures, policymakers look at past extreme weather events to make assumptions on the human, physical, economic, and fiscal costs of climate change. This assumes a static baseline against which to measure progress. Unfortunately, the physics of climate change imply that the baseline is dynamic and, as such, policymakers must adopt other instruments. The robust decision-making (RDM) analytic framework offers such instruments, like the dynamic adaptive policy pathways (DAPP) approach, which explicitly includes and accounts for decision-making over time (Kwakkel et al., 2015) (see Figure 1.6).

Even if models succeed in capturing many of the complex interactions, it is important to understand the limitations and constraints of climate change adaptation. It may be economically viable for cities such as London, Miami, or Venice to invest in sea rise defenses, as well as in better health systems to deal with extreme heatwaves. In a 1.5°C warmer world, 13.8% of the world population will be exposed to severe heat waves at least once every five

FIGURE 1.6.
The Dynamic Adaptive Policy Pathway Approach (DAPP)



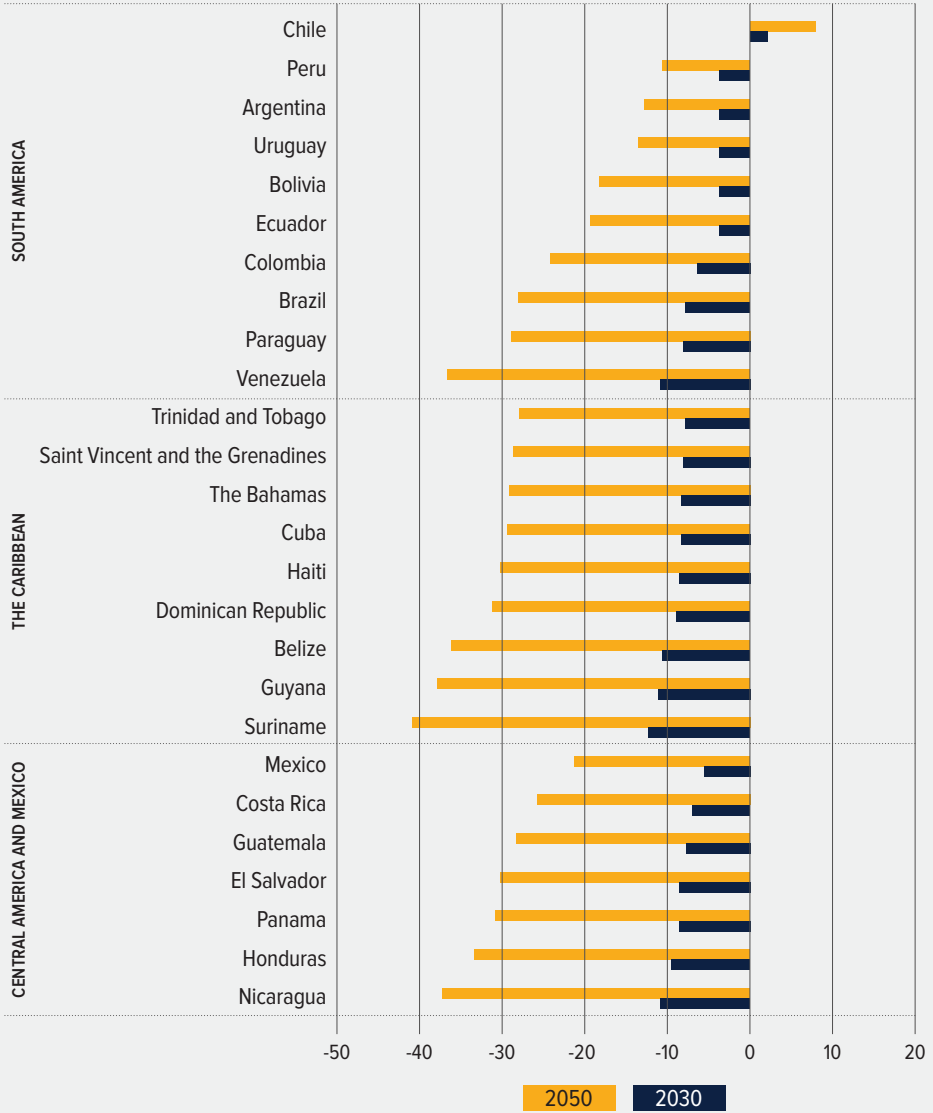
SOURCE: Reprinted from *Designing Adaptive Policy Pathways for Sustainable Water Management Under Uncertainty: Lessons Learned from Two Cases.*, by Haasnoot, M., Kwakkel, J. H., and Walker, W. E., 2012. CC BY 4.0

years. The figure rises to 36.9% with 2.0°C warming, or approximately an additional 1.7 billion people (Dosio et al., 2018); the percentage of affected population grows exponentially with rising temperatures, as does the intensity, frequency, and the costs tied to extreme weather events (Swiss Re, 2020). This translates into higher costs, which are already being documented. Early climate models discussed and predicted damages on a yearly and quinquennial basis; now, the manifestations of climate change are such that NOAA and Swiss Re (amongst others) have adopted a monthly frequency to analyze the evolution of damages. In Latin America and the Caribbean, most of the region's wealth is concentrated in coastal cities, urban and peri-urban areas. If cities can employ enough resources to implement some adaptation measures, coastal peri-urban agglomerations will have fewer resources to react. Unfortunately, most of the available figures of existing costs and damages are generated in more developed nations, leaving an important knowledge gap. A 2014 World Resources Institute study highlights the fiscal and economic stress that rising sea level generates for a wealthy city such as Miami (Tompkins and Deconcini, 2014), but few studies like this exist for Latin American cities. Global estimates indicate that even with constant adaptation investments to safeguard against flood probability, subsidence and sea level rise will increase losses to US\$60-63 billion per year by 2050 (Hallegate et al., 2013). Without adaptive measures, costs could surpass US\$1 trillion per year. A recent National Oceanic and Atmospheric Administration (NOAA) report highlights that in 2020, the United States suffered 22 weather events with losses exceeding US\$1 billion each. Between 1980 and 2020, the United States sustained 285 weather and climate disasters, which cost a total of US\$1.875 trillion (NOAA, 2021).

Galindo (2021), following Dell et al. (2009), addresses this knowledge gap in Latin America, based on cross-section and panel data. His estimations indicate that a 1°C increase in temperature can reduce GDP per capita by 8.5% using cross-country data, and between 1.1% and 1.9% using municipal data. Burke et al. (2015) estimate a 23% drop in global GDP per capita by 2100 with a more intense contraction in Latin America (between 70% and 75% by 2100), where important differences are observed between countries (Figure 1.7). Furthermore, Burke and Tanutama (2019) estimate, with a panel data model, significant effects of temperature on per capita income where tropical countries are at least 5% poorer and present no relevant adaptation.

FIGURE 17.

Effects of temperature increase on per capita income. Estimates based on Burke et al. (2015)



SOURCE: Data from Burke et al., (2015)

CHAPTER 2

IN THE EYE OF THE STORM

As varied as the Latin American and Caribbean region is, its countries share a high level of vulnerability to the consequences of climate change. In some subregions, this vulnerability is driven mostly by natural phenomena while in others, adaptive capacity gaps act as the main driver. This chapter illustrates the pervasive nature of climate change and its influence on other socioeconomic growth factors. It also provides an overview of methodologies that attempt to monetize them.

CLIMATE VULNERABILITY IN LATIN AMERICA AND THE CARIBBEAN

There are numerous recognized efforts to measure and rank countries according to their vulnerability. For the past 20 years, Notre Dame University's Global Adaptation Initiative Index (ND-GAIN) has used more than 45 indicators in 181 countries to measure both climate vulnerability and readiness around the world (Notre Dame Global Adaptation Initiative, 2020). Other efforts at the regional level allow for greater precision, such as the Caribbean Vulnerability Score (Stennett-Brown et al., 2019) or the Caribbean Development Bank's Vulnerability Index (Ram et al., 2019). Germanwatch's Global Climate Risk Index captures similar, complementary dimensions of the consequences of climate change (Germanwatch, 2020). All indices confirm the predictions of the global scientific community's flagship IPCC reports and underscore the need to build adaptive capacity at the national and subnational levels.

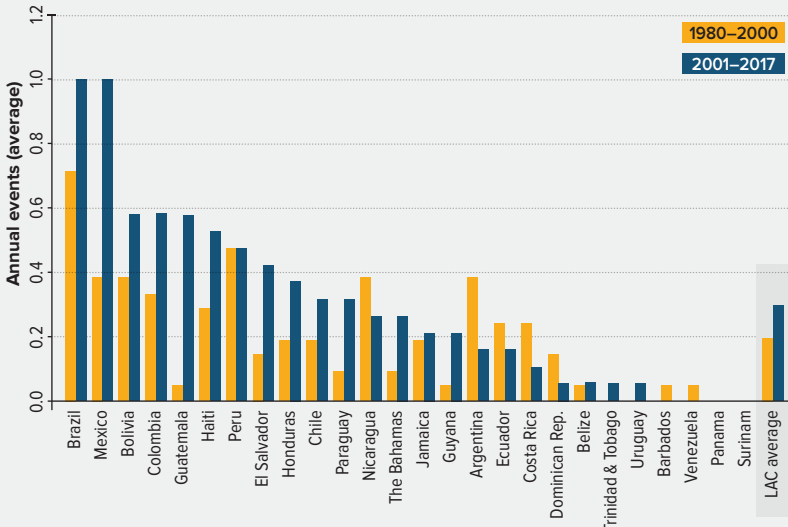
The region's vulnerability profile is evident. Although country rankings vary from year to year, using data between 1995 and 2018, the Germanwatch index ranks several Latin American and Caribbean countries among the 10 most vulnerable countries to climate change.⁸ The same applies to the 25 most vulnerable countries (10 of which are from the region). Notably, Central America and the Caribbean are two of the most vulnerable geographic areas in the world (see Figures 2.1 and 2.2).⁹

All countries in Latin America and the Caribbean ratified the Paris Agreement and almost all in the region have embraced the more ambitious objective of limiting temperature increases to 1.5°C (see Figure 2.3). While Paris calls to maintain the rise in temperature "well below 2.0°C", the region has a self-assigned objective of stabilizing temperature increases at 1.5°C. Indeed, the difference between 1.5°C and 2.0°C may place an additional 10 million people at direct risk from sea level rise, push several hundred million more into poverty, and expose 50% more people to water and other stresses (IPCC, 2018). Understanding the physical manifestations and the ensuing economic impacts to a region subject to an average increase of 1.5°C can be daunting. On these matters, national authorities rely on projections made by the IPCC. Nevertheless, the articulation of complex climate science with policymaking can be daunting. The role of MDBs in helping design proven, transformative policies is critical; under current scenarios, the planet is on track to hit the 1.5°C increase as early as 2030.

8 The number of vulnerable countries in the region varies from year to year as the ranking is partially a function of extreme meteorological events induced by climate change. In the last 25 years, as few as 4 and as many as 8 countries in Latin America and the Caribbean have figured in the top 10 most vulnerable countries.

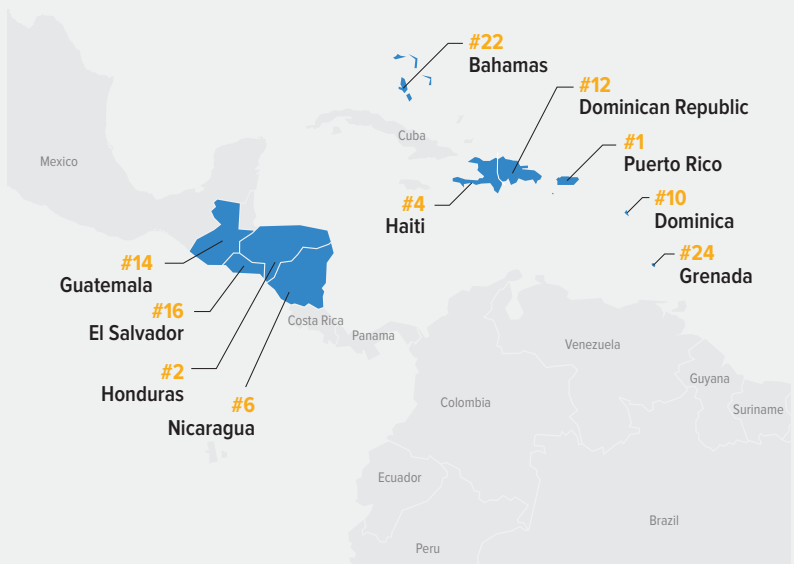
9 Between 1998 and 2017, the most vulnerable countries or territories in the region and their ranking were: Puerto Rico (1); Honduras (2); Haiti (4); Nicaragua (6); Dominica (10); Dominican Republic (12); Guatemala (14); El Salvador (16); The Bahamas (22); and Grenada (24) (Germanwatch, 2020).

FIGURE 2.1.
Extreme Climate-Related Weather Event Frequency in Latin America and the Caribbean, 1980 – 2017



SOURCE: Reprinted from *Estimating the Fiscal Impact of Extreme Weather Events* by Alejos, L., 2018.

FIGURE 2.2.
Most Affected Countries Due to Climate Change, 1998–2017



SOURCE: Data from Germanwatch (2020)

FIGURE 2.3.

Latin American and Caribbean Countries that Committed to the 1.5-Degree Goal at COP25

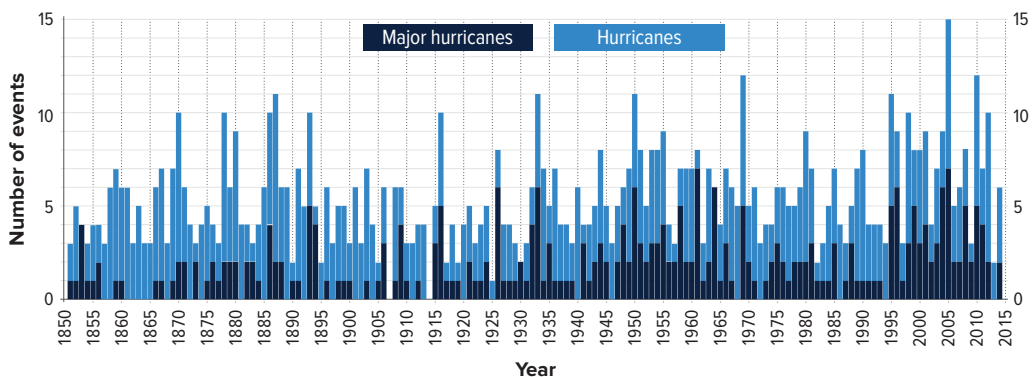


SOURCE: Data from COP 25 Chile (2019)

Losses and damages follow exponential growth curves with higher average temperatures. By 2017, the planet had already reached an average warming of 1.0°C above pre-industrial levels; some regions had already warmed by 1.5°C (IPCC, 2018)—the fastest warming rate in Earth’s history. Data in the United States help illustrate these dangers: 2019 was the sixth consecutive year in which ten-or-more-billion-dollar weather and climate disaster events impacted the country, confirming a trend that has only increased over the last 40 years (Smith, 2020). The physical manifestations of such an increase are already visible: wildfire seasons are longer and more expensive. Insurer Munich Re (2019) attributed US\$24 billion of losses in the California wildfires to climate change and a lack of effective landscape planning in the United States. While strict causal links between climate change and hurricane frequency are a subject of scientific debate, the role of climate change in amplifying these weather phenomena as well as rainfalls and storm surges is commonly accepted (Mann et al., 2017).

The economic consequences of these weather events for Central America and the Caribbean have been severe. Between 1950 and 2016, the Caribbean experienced 324 weather-induced natural disasters, which killed more than 250,000 people and caused US\$22 billion in losses (IMF, Communications Department, 2018). Given the evidence of the last 30 years, Central America is the tropical region that has most suffered from climate change (Giorgi, 2006). Between 2000 and 2009, 39 hurricanes hit the Caribbean basin, compared to 15 in the 1980s and 9 in the 1990s (Galindo et al., 2010). At the regional level, the frequency of extreme weather events has increased from an annual average of 0.20 for the 1980–2000 period to 0.30 for the 2001–2019 period (Alejos, 2018). An analysis of hurricane frequency and intensity between 1850 and 2015 in the Atlantic Basin confirms the Central America and Caribbean trends (see Figure 2.4).

FIGURE 2.4.
Atlantic Basin Hurricane Count from 1850 to 2015

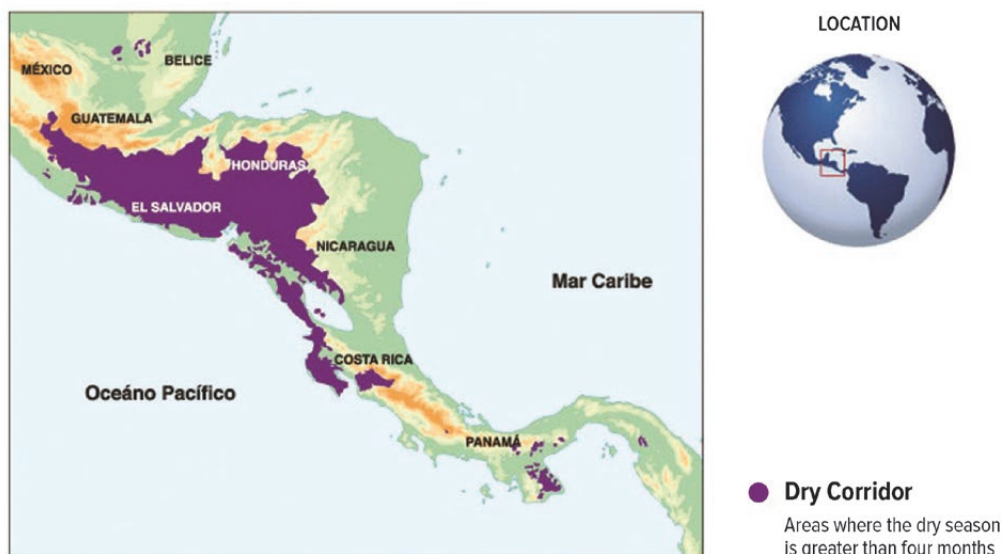


SOURCE: Reprinted from *North Atlantic Tropical Product*, by NOAA, n.d., https://www.ssd.noaa.gov/PS/TROP/Basin_Atlantic.html

While coastal areas with elevations below 10 meters above mean sea level account for only 2% of the Earth's surface, approximately 10% of the global population lives in these vulnerable zones. In Latin America and the Caribbean, between 29 and 32 million people reside in these areas, and the trend is growing due to the expansion of certain economic activities such as tourism (Reguero et al., 2015). In fact, more than 60% of Latin America and the Caribbean's population resides in coastal urban centers (Brusa, 2020). Considering all floodable areas from 100-year events, as much as US\$334 billion in capital is exposed —and this figure does not factor in the economic consequences of extreme-weather-related natural disasters such as hurricanes (Reguero et al., 2015).

Regarding agriculture, drought conditions in Central America and the Caribbean in the 1950-2010 period increased in line with climate model predictions (Dai, 2013). The direct social and economic consequences for the sector are evident in Central America's so-called dry corridor (see Figure 2.5). The dry corridor is a stretch of land that extends 1,600 km from Chiapas in Mexico to Costa Rica and Panama, and includes Guatemala, El Salvador, Honduras, and Nicaragua. From east to west, it stretches between 100 and 400 km, and includes 90% of Central America's population, including its capital cities. The dry corridor has always suffered from El Niño effects, but independently of El Niño years, the corridor has repeatedly suffered from the growing physical manifestations of global warming.¹⁰ Contrary to hurri-

FIGURE 2.5.
Central America Dry Corridor



SOURCE: Reprinted from *Corredor Seco – América Central. Informe de Situación*, by FAO, 2016, <http://www.fao.org/3/a-br092s.pdf>. CC BY-NC-SA 3.0 IGO

10 El Niño effects occur independently of climate change, and the scientific community tends to agree that the data is insufficient to establish causality between rises in mean surface temperature and stronger El Niño events.

canes, which generate economic losses across all sectors, droughts tend to concentrate damages and costs in the water and agricultural sectors. During the last 30 years, the dry corridor lost US\$9.8 billion due to droughts, with approximately half of these losses concentrated in the agricultural sector (Echeverría, 2009). More importantly, the economic consequences of climate change have resulted in a severe, almost chronic, social crisis. In Guatemala, Honduras, and El Salvador, of a total population of 10.5 million people, 3.5 million needed humanitarian assistance and 1.6 million were considered food-insecure in 2016 (FAO, 2016). After ten years of increasing extreme weather events, basic crop loss rates varied by country between 50% and 90%. By April 2019, some 2.2 million subsistence farmers in these three countries and Nicaragua had suffered major crop losses. Of these, 1.4 million were in urgent need of food assistance. Up to 82% of these basic grain producers had sold their farming tools and animals to purchase food (FAO, 2019). This, in turn, has fueled migratory trends, and while climate change has always been an underlying factor behind migratory decisions, it has not been deemed the most important driver. In 2018, surveys conducted by the International Organization for Migration at the border of recipient countries showed that 18% of Guatemalan migrants cited climate as the primary reason for their migratory decision, while just as many cited violence and criminality as a factor (IOM, 2018). These figures are not mutually exclusive and highlight complex compounding effects that can further weaken institutions in more vulnerable states. Indeed, evidence from other regions suggests that climate-derived losses in income may feed criminal activities, as demonstrated by the exponential rise in terrorist movements throughout the Sahel after a series of consequential droughts (Brusa, 2013).

POISED FOR A DIRECT HIT: THE REGION'S MOST VULNERABLE SECTORS

Agriculture: A Vulnerable Growth Engine

Climate-derived estimates for the agricultural sector indicate significant effects. The vulnerability of agriculture in Latin America and the Caribbean stems from several sources.¹¹ One of these is extreme climate events, to which the region is particularly exposed and which are becoming increasingly frequent and intense due to climate change —on par with model predictions. In addition, climate change is expected to render some areas no longer suitable for agriculture: in Mexico, Mendelsohn et al. (2010)

¹¹ Agriculture in its broad sense is defined to include agriculture (crop farming), livestock farming, fishing, and forestry.

estimate land value changes that oscillate between -42% and -54% when accounting for rainfall and irrigation. Looking at Peru and Mexico, Galindo et al. (2015) also estimate that an increase in temperature of 2.5°C and a reduction of 10% in precipitation leads to a reduction of between -18.6% and -36.4% of the net income of farms in Mexico, with differences between irrigated and non-irrigated areas, and a drop of between 8% and 13% in the expected income per cultivated hectare in Peru. More alarmingly, Peru's figures account for the implementation of adaptive processes. Other manifestations of vulnerability include the reduction of marine populations due to ocean acidification, and the propagation of pests and diseases that affect plant and animal species in agricultural production. At the same time, the volume and patterns of food trade will change (Ahammad et al., 2015). Lastly, market volatility is also a risk factor affecting the yield of agricultural activities. Some of the ongoing physical manifestations of climate change that affect agriculture and create volatility in markets include diminished water availability, supply chain disruptions, and inadequate storage conditions, as well as damage to infrastructure and inaccessible public services (FAO & PAHO, 2017).

Productivity losses derived from climate change are non-negligible: in Central America, increases in temperature are linked to the coffee rust epidemic that caused production to decline by up to 25% in the 2012-2013 cycle (CEPAL & CAC/SICA, 2014). Land used for coffee, corn, and bean production is expected to become less suitable for these purposes. In the case of beans, 81% of Honduran municipalities currently producing this crop are expected to become unsuitable by 2030 (Bouroncle et al., 2015). In the case of coffee, the optimal farming altitude will be higher in 2050 (from the current 800-1,400 meters above sea level (masl) to 1,200-1,600 masl in Nicaragua (Laderach et al., 2009) and from 900 masl to 958 masl in El Salvador (CIAT, 2019), thereby substantially reducing the area apt for this crop. By the end of this century, South America could lose up to 21% of its arable land (Zhang and Cai, 2011).

While the share of agriculture in Latin America and the Caribbean's GDP has fallen in recent years—from 10% of GDP in 1980 to 4.7% in 2017 according to the World Bank (2019a)—it accounts for 14% of formal employment in the region (Bárcena Ibarra et al., 2020). Notwithstanding variations across countries in the region, the main trends paint a clear picture of climate exposure: even though large farms play a significant role in revenues from exports, in 2014, half of the region's food production came from almost 14 million small-holder farmers (Truitt Nakata and Zeigler, 2017). Rural poverty is significant in a region where nearly 18% of the region's population lives in rural areas. Starting in 2014, rural poverty began to rise throughout the region. By 2017, rural poverty accounted for 32% of Latin America and the Caribbean's poor, or 59 million inhabitants. In 2018, 27 million of the region's inhabitants lived in rural areas and faced extreme poverty (FAO, 2018) (see Figure 2.6).

FIGURE 2.6

Poverty and Extreme Poverty Rates, and People Living in Poverty and Extreme Poverty in Latin-America and the Caribbean, 2002–2016



SOURCE: Reproduced with adaptations from *Panorama Social de América Latina 2019*, by CEPAL, 2019, <https://repositorio.cepal.org/handle/11362/44969>. Additional data from Brusa (2020).

BOX 1**A Proven Policy Solution: Furthering Development of Agricultural Insurance Markets**

The agricultural insurance market in Latin America and the Caribbean is still incipient but exhibits positive signs of development. In 2014, the penetration rate of this type of insurance in the region averaged 0.03% of GDP, higher than in Asia and Africa but lower than in the United States and Canada (0.06% of GDP on average). A few countries dominate the market: in 2014, Brazil accounted for 61% of all premiums paid in the region, while Argentina and Mexico accounted for 15% each. Beyond these three countries, some initiatives also exist in Uruguay, Paraguay, and Ecuador. In most Latin American and Caribbean countries, the public sector plays an important role in providing insurance or reinsurance and coexists with private sector companies (Swiss Re, 2016). The growth in premiums paid in the region and the development of new technologies are signs of a development opportunity for agricultural insurance in the region (see IDB (2014) for more information on the development of these markets).

While rural poverty has been declining, climate vulnerability has encouraged people to migrate to cities, resulting in new urban policy challenges (De Janvry et al., 2002). In Honduras, 76% of people who migrated came from 295 rural municipalities. In El Salvador, 70% came from 257 rural municipalities while in Guatemala, 61% of emigrants came from 325 rural municipalities (FAO, 2018). Climate also exacerbates the poverty gap between urban and rural centers within the region: Jesspe et al. (2018) estimate for Mexico that extreme heat reduces local employment by 1.4% and increases migration by 1.4%. In Brazil, Hidalgo et al. (2010) find that changes in precipitation patterns lead to a 4% reduction in income and a significant increase in land invasions.¹² This is consistent with the evidence that temperature shocks lead to migration in South America (Thiede, et al., 2016). Large migration flows contribute to a further

decay of the region's rural areas. As of 2016, 48.6% of the rural population of the region lived in poverty and 40% in extreme poverty, significantly more than the urban population, which has 26.8% living in poverty and 7.2% in extreme poverty. While the term climate refugee has no legal meaning, the United Nations High Commissioner for Refugees (UNHCR) recognizes the already substantial and growing number of forced displacements that have been driven by climate, either directly or indirectly. In the most vulnerable areas of the region, climate migration is a reality that often stems from poor adaptive capacity to maintain sustainable livelihoods.

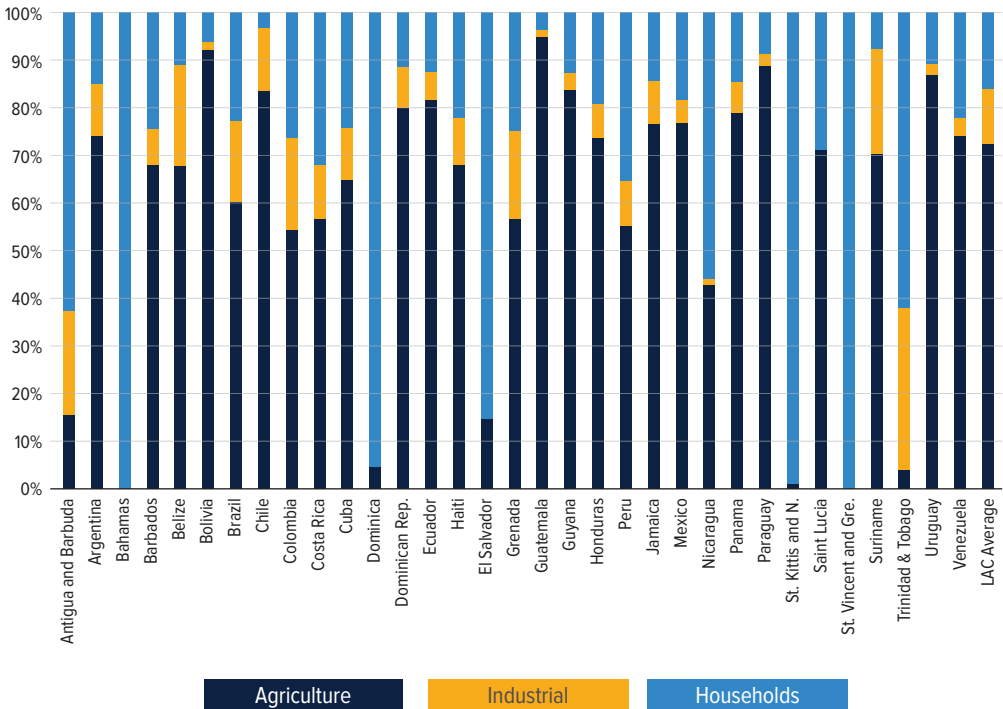
While in the short run some geographic areas in the southern cone may benefit from a changing climate (Bárcena et al., 2010), most of the region's producers are already struggling to face ongoing changes in mean temperatures. Expected higher mean temperatures and exacerbated droughts help illustrate why climate change is considered a threat multiplier: it acts as a stressor on more vulnerable populations and contributes to further migration, poverty, and criminality (US Department of Defense, 2015). Other factors highlighted by the IPCC (2014) that are already hurting agricultural output include exacerbated seasonal variability, soil salinization, altered carbon and nitrogen storage, stream acidification, and surface runoff. A common driver behind these factors is the threat to another of the critical sectors: water.

¹² Hsiang, Burke and Miguel (2013) also estimate an increase in conflicts due to climate change.

Water: The Principal Preoccupation for Equitable, Sustainable Development

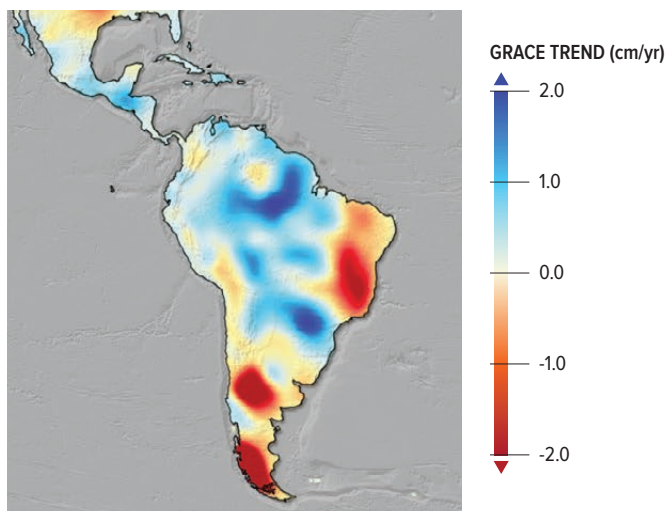
Latin America and the Caribbean is endowed with the world’s largest amount of renewable water resources per capita, per year. In 2014, a person from Latin America and the Caribbean could, on average, have access to up to 22,232 cubic meters of water per year, versus 16,004 in North America, 7,855 in Europe and Central Asia, and a world average of 5,921 (Rud, 2019). Here again, the IPCC notes that the difference between a mean temperature increase of 1.5°C and 2.0°C translates into a 50% increase in the population exposed to water stress (IPCC, 2018.) Under this context, the region’s needs for sustainable water resource management practices are particularly relevant. While the agriculture sector is the main user of water, it is closely followed by human consumption (see Figure 2.7). On average, water availability is relatively high in the region, but its distribution is uneven (Magrin et al., 2007), revealing the geography of social inequalities. Climate change is widening this divide even more. Water is indeed one of the most valued, and for some people scarce, resources in Latin America and the Caribbean.

FIGURE 2.7.
Water Use by Sector, 2014



SOURCE: Reprinted from *The Future of Water: Lessons and Challenges for LAC*, by Rud, J. P., 2019, p. 9. Copyright © 2019 Inter-American Development Bank. CC-IGO BY-NC-ND 3.0 IGO.

FIGURE 2.8.
The Effect of Fresh Water Reductions on Major Urban Centers



SOURCE: Reprinted from *Trends in Global Freshwater Availability from the Gravity Recovery and Climate Experiment (GRACE), v1 (2002-2016)*, by NASA SEDAC, n.d. CC BY 4.0.

NOTES: NASA's Gravity Recovery and Climate Experiment (GRACE) mission from 2002 to 2016, showing where freshwater storage was higher (blue) or lower (red) than the average for the 14-year study period

Water issues are as relevant for the urban population as they are for the rural economy. The region is the most urbanized in the world (81%) with a projected urbanization rate of 86% by 2050 (UN DESA, 2018). Latin America and the Caribbean also has the highest concentration of people in metropolitan areas, with 35% of its population living in large cities of more than one million inhabitants (Jaitman, 2015); another 32% of the region's population resides in intermediary cities (i.e., between 100,000 and 1 million people).¹³ Overcrowded cities threaten access to water and heighten health concerns. Historic migratory shifts towards cities, compounded by climate and conflict-induced migration, act as a stressor on

an increasingly scarce resource. The situation is exacerbated by a decline in water availability due to the retreat of tropical and extratropical glaciers and ice fields, as well as reduced precipitation patterns. Urban growth, unsustainable land use, and agricultural practices such as deforestation aggravate the problem of water availability.¹⁴ Overall, the region is expected to suffer severe reductions in water availability all along its coastlines and other major population concentration areas (see Figure 2.8).

However, climate change does not only pose a serious threat to social development by reducing freshwater availability. It also threatens one of the region's biggest advantages for competitiveness and economic growth.

Energy: Leveraging the Region's Renewable Endowments

Hydropower accounts for 197 GW of power generation capacity throughout Latin America and the Caribbean (IHA, 2020) and in 2017, it represented 54.8% of all generation in the region (International Energy Agency, 2020).

13 Exposure to water access risks is compounded considering that more than 60% of the Latin American and Caribbean population lives in urbanized coastal zones (Barragán and de Andrés, 2016), mostly in areas below five meters above sea level (CIESIN, 2012).

14 A successful example of an intervention that helps municipalities coordinate on water resource management while building transformative institutional adaptive capacity is the Climate Investment Fund's Pilot Program for Climate Resilience, which is being executed jointly by the Government of Bolivia, the IDB, and the World Bank. Specifically, by focusing on drinking water and irrigation programs in the municipalities of Batallas, Pucarania, and El Alto, substantive progress was achieved in developing adaptive capacity (Allen et al., 2020).

Hydropower is one of the region's most important natural capital endowments. Climate-induced water stress can thus transform an endowment into a liability. In fact, while models have limitations, the water-energy nexus also illustrates the need to employ adaptive policy planning instruments. Successfully achieving the objectives of the Paris Agreement will require substantial infrastructure investment in existing hydro installed capacity (Alarcón Rodríguez and Alberti, 2020).

However, the over-reliance on a now-vulnerable growth factor threatens energy security. Even though Latin America and the Caribbean is one of the world's lowest contributors to GHG emissions, it is one of the most susceptible to extreme weather events due to climate change. In this sense, droughts, hurricanes, and lower water levels can easily damage large hydropower infrastructure and thus compromise energy security. Besides a higher concentration of risks, large hydropower also tends to disturb ecosystems, with serious environmental and social consequences such as floods and community displacements that can deepen these threats (Morshed and Zewuster, 2018). Moreover, traditional biofuel uses in rural areas, a contested renewable energy source, can also lead to deforestation and other negative social and environmental spillovers (FAO, 2008; Janssen and Rutz, 2011). Finally, countries that depend on fossil fuel imports to provide energy are subject to commodity volatility in international markets and the resulting vulnerability can lead to energy shortages. As will be demonstrated, the transition to a fully renewable energy matrix is viable and a wide mix of conventional and nonconventional renewables is available. Recent financial and technological developments validate this approach.

Health: A Casualty of Multiple Climate-Driven Risks

Water-related infections and microbial events such as the cyanobacteria algae blooms that have propagated in most of Latin America and the Caribbean in recent years highlight the need for coordination between urban and rural areas as well as across the water, agriculture, and health sectors. Higher temperatures over longer periods of time combined with high concentrations of nutrients in water bodies will increase the risk of water and mosquito-borne diseases (Hallegatte et al., 2016, Watts et al., 2015). The city of Montevideo, Uruguay experienced such an outbreak when the main drinking water source was threatened by an algae bloom fueled by an excessive use of nitrates and phosphates in peri-urban agricultural practices. These photosynthetic prokaryotes have adapted over time and are thriving in an increasingly warmer planet, often reaching concentration levels that make water dangerous for human consumption (Paerl and Huisman, 2008). Harmful algal blooms (HABs) not only directly affect several sectors, such as tourism and agriculture, but also produce phycotoxins that can accumulate in the food web and ultimately endanger humans. A study by the Woods Hole Oceanographic Institution estimated that the economic impact of HABs in the United States during the 1987-1992 period was as high as US\$743 million per

year distributed across public health (45%), commercial fishery (37%), recreation and tourism (13%), and others (4%) (Anderson et al., 2000).

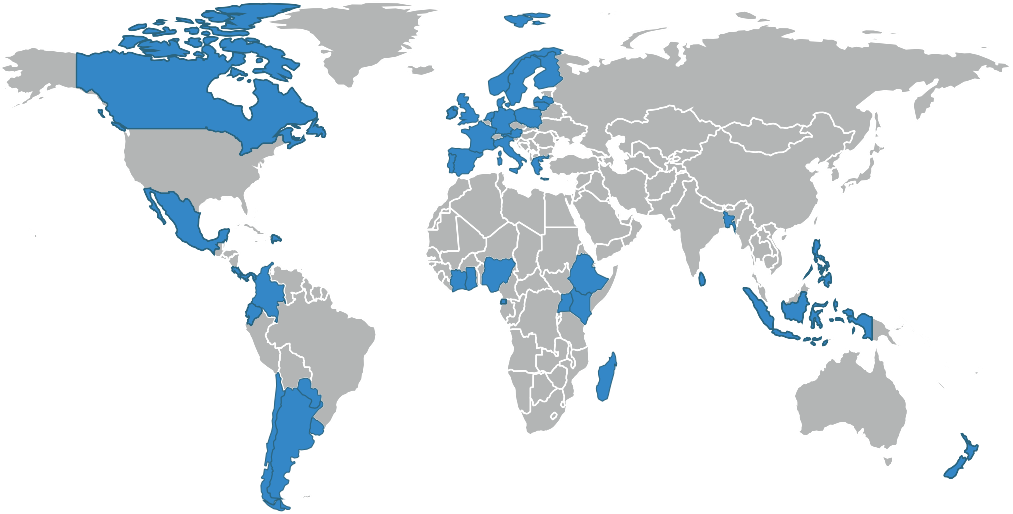
Climate change has been recognized as one of the greatest looming public health threats. An exhaustive scientific analysis conducted by the US Global Change Research Program (USGCRP, 2016) identified the following climate drivers: (i) increased morbidity rates caused by extreme weather events such as floods and heat waves; (ii) increases in vector-borne diseases caused by propagation shifts due to weather deregulation (extreme temperatures and weather patterns); and (iii) increases in exposure and risk to existing and new threats through water-related infections. However, while the connection between climate change and disease propagation is understood, its interactions with factors such as land-use change and migrations are complex and complicate an understanding of the process. Research is now using system dynamics modelling techniques to better understand these interactions and formulate effective, tailored responses (Franklinos et al., 2019). Of course, the gaps in knowledge should not preclude policymakers from mitigating the drivers of climate change and thus, underestimate the economic and social impacts already underway.

THE ECONOMICS OF CLIMATE CHANGE

Following the increasingly frequent and costly economic impacts of climate change, policymakers must rethink climate policies. A traditional school of thought long insisted on classifying climate policy as a tragedy-of-the-commons type problem: policymakers deferred costly political and economic action to the future since no immediate gains were achievable. That is no longer the case. Many sound climate policies also generate short-term economic and welfare benefits. The transversal nature of climate impacts and the novelty of the issue for economic policymakers is, however, not without challenges.

Finance Ministers for Climate Action

The design of climate policies requires that the scientific and climate communities provide policymakers with reliable, actionable evidence to guide politically feasible action. Later chapters will demonstrate how this is already occurring in the region. In this spirit, the ministers of finance of Chile and Finland announced the Santiago Action Plan (The Coalition of Finance Ministers for Climate Action, 2019) at the 25th Conference of the Parties (COP) to the U.N. Framework Convention on Climate Change (UNFCCC). Today the Coalition of Finance Ministers for Climate Action represents an international practice group that includes several Latin American and

FIGURE 2.9.**Member Countries of the Coalition of Finance Ministers for Climate Action**

SOURCE: Data from The Coalition of Finance Ministers for Climate Action. (n.d.)

Caribbean countries as well as their counterparts from across all continents and institutional partners like the International Monetary Fund (see Figure 2.9). However, thanks to more advanced environmental policies, the coalition has a natural bias towards European policy solutions, which fail to properly account for the institutional, regulatory, social, and economic realities of other, extra-European nations. A political economy approach to the region's climate challenges identifies those impacts that speak more to a finance minister, as they manifest themselves in short-term, albeit direct, concrete budgetary consequences. Responding to a mandate by countries of the region at its 2021 annual meeting of its Board of Governors, the IDB is establishing a platform to achieve these objectives using a region-driven approach.

The Case for Finance Ministry Intervention in Adaptation Policy

For the purpose of establishing policy priorities, the evidence collected by Alejos (2018) is useful. Extreme-climate-related hydrometeorological events are becoming more frequent: 17 of the 18 warmest years on record occurred between 2001 and 2017.¹⁵ The warming trend coincides with a considerable increase in climate-related natural disasters, which jumped from 222 in 1980 to more than 700 in 2016, with a 50% increase in such events in the region during that period (Munich RE, 2018).

15 In 2020, NASA's NOAA released an updated list including the year 2019.

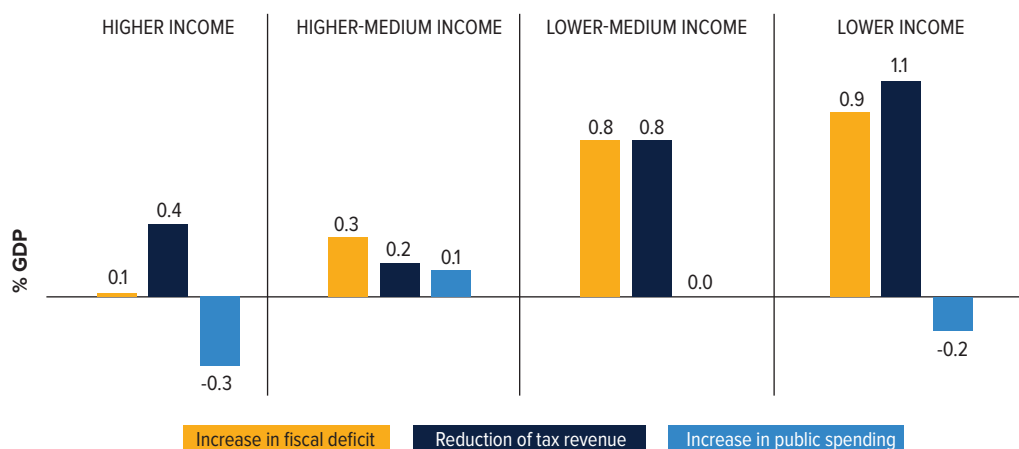
These events are very costly from the public finance perspective as public resources must be allocated for reconstruction and recovery, particularly in the case of infrastructure. Lower economic activity weakens public finances, deteriorates debt sustainability, and affects competitiveness by slowing down needed investments. Thus, an extreme weather event can increase the fiscal deficit of a Latin American and Caribbean country up to 0.8%-0.9% of GDP. These events also reduce tax revenue by 0.9%-1.1% of GDP (see Figure 2.10). The lack of access to international debt markets that some countries face can play a compounding effect. The increased, almost yearly occurrence and the nonlinear progression of climate-related extreme weather events is particularly worrisome for the region and demands effective short-, medium-, and long-term planning by policymakers.

Given the frequency of extreme weather events, adaptation strategies are necessary (but not sufficient) to deal with the consequences of climate change. Short-run infrastructure retrofitting, and adjustments are examples of what needs to be done. Projected losses are significantly higher for low-income countries than they are for advanced economies (Hoegh-Guldberg et al., 2018), thus creating a potential poverty trap for countries that do not invest in both gradual adaptation measures as well as adaptive capacity.

Climate adaptation measures should thus become part and parcel of public investment decisions. The Global Commission on Adaptation (2019) finds that the return on investment for adaptation is high, with cost-benefit ratios varying from 2:1 up to 10:1 and higher in certain cases. Thus, investing US\$1.8 trillion globally in five areas from 2020 to 2030 could generate US\$7.1 trillion

FIGURE 2.10.

Fiscal Impacts (Mean) of the Occurrence of Extreme Weather Events, By Country Groups in Latin America and the Caribbean, 2000 to 2015



SOURCE: Reprinted from *Estimating the Fiscal Impact of Extreme Weather Events* by Alejos, L., 2018.

NOTES: It measures the variation in relation to the extreme event in the year prior

in total net benefits, with up to US\$4 trillion coming from investments in sustainable infrastructure.¹⁶ The Global Commission on Adaptation also illustrates the three ways in which adaptation investments deliver benefits: (i) They reduce risks (adaptation lowers financial costs, increases security, and makes investments more appealing in regions, cities, or industries where those investments would otherwise appear too vulnerable); (ii) They improve productivity. Investing US\$250–500 per hectare in better dryland farming practices could increase cereal yields by 70–140%, bringing net economic benefits of billions of dollars. For example, flood-resistant varieties of rice in Orissa, India not only reduced losses during times of floods but also boosted farm yields during normal years (Dar et al., 2017); (iii) Finally, adaptation measures drive innovation and contribute to new technologies and unforeseen market opportunities. Drip irrigation technologies, first developed to address severe water scarcity, are spreading because they are also better and more efficient.

From Adaptation Policy to Paris-Aligned Sustainable Development Pathways

In many aspects, the Stern Review laid the foundations for the involvement of finance ministers in climate action.¹⁷ In 2005, Gordon Brown, then Chancellor of the Exchequer of the United Kingdom, asked Sir Nicholas Stern to “lead a major review of the economics of climate change, to understand more comprehensively the nature of the economic challenges and how they can be met, in the U.K. and globally” (H.M. Treasury, 2005). The Stern Review, as it came to be known, helped translate the science of climate change into the language of economic decision-making.

Today, a lot of work remains to be done for finance ministers to effectively integrate the climate issue and its consequences into their mandate. Delgado, Eguino and Lopes (2020) identify some policy instruments that can be used to mainstream climate policy into the respective mandates of finance and planning ministries. Ultimately, involving fiscal planners is critical because climate change: (i) threatens all the developmental achievements of the last half century; (ii) generates ongoing and future compound, negative effects; and (iii) represents a systemic risk for social and economic growth.

From a global perspective, the Coalition of Finance Ministers offers an excellent platform to better understand international trends such as green bond taxonomies or the IMF’s thinking regarding green recovery packages, climate policy, and its recent developments such as the inclusion of domestic climate policy evaluation under article IV country consultations

16 The five areas considered by the report are climate-resilient infrastructure, improved dryland agriculture, mangrove protection, water resource resilience, and early warning systems.

17 The Stern Review comprised a team of economists from Her Majesty’s Treasury and a scientific review team from within the Walker Institute at the University of Reading. The Stern Review was not without criticism in 2005, most notably, on the present value of the costs of climate change, but it was overwhelmingly well received by academics and policymaker.



BOX 2

The Stern Review's Role in Understanding Climate Change in Mexico

In Latin America and the Caribbean, many countries followed the Stern Review's approach to conduct national or subnational assessments of the economic and social implications of climate change. These studies were conducted by ECLAC and the Inter-American Development Bank (IDB), at the request of finance ministries. The *Economics of Climate Change in Mexico*, coordinated by the Ministries of the Environment (SEMARNAT) and Finance made the case for creating a dedicated climate working group within the Finance Ministry. The main recommendation behind this approach is to put planning and budgetary decisions, as well as green financial market developments, at the core of economic policies (SEMARNAT & SHCP, 2011). As a sequel to the Stern Review, the U.K. Treasury commissioned in 2019 the Dasgupta Review, hoping to follow the same approach for biodiversity.

(Georgieva, 2021). At a national or even regional dimension, more work remains to be done to support Latin American and Caribbean finance and planning ministers in taking ownership of their respective agendas.

Beyond the risks of climate change, this work also illustrates how it is possible to respond to climate while attaining sustainable developmental achievements. In other words, climate policies can achieve growth in the short term, which also strengthens the resiliency and social development of Latin American and Caribbean societies. Achieving this is only possible if finance and planning ministries assume a leadership role by ensuring that resource allocation prioritizes these approaches. This work also highlights why it is in the interest of these ministries to embrace this approach.



CHAPTER 3

THE RESPONSE TO CLIMATE CHANGE

The Paris Agreement changed international climate negotiations by lowering, but not eliminating, one of the most important historical obstacles to climate action: the difference between developing and advanced nations, or Annex 1 and non-Annex 1 nations. While the Paris Agreement recognizes common but differentiated responsibilities, it uses the NDC framework and its voluntary approach to build goodwill through national commitments across the board. Latin American and Caribbean countries offer interesting examples of how NDCs can be designed to achieve the objectives of the Paris Agreement while complementing policy planning instruments.

HARNESSING THE WIND: SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND THE CLIMATE OPPORTUNITY

Environmental policy emerged as a new area of domestic policy in developed nations during the 1950s focusing solely on environmental regulations. At the international level, this approach was initially met with apprehension as developing nations highlighted the need to catch-up to more industrialized nations while also enacting environmental policies that did not hamper economic development. In the 1980s and 1990s, most countries in the region created ministries of the environment that largely mirrored those of advanced nations with a strict focus on environmental regulation. This set-up led to powerful corporatist responses by groups with concentrated interests, as well as to the perception that environmental policy compromised economic development. Today, most policymakers in Latin America and the Caribbean understand that economic development must be sustainable, but substantial market failures remain to be addressed. In Europe, countries such as France and Spain have transformed their environmental ministries into ecological transition ministries that emphasize the concepts of just transition and sustainable economic development pathways (for more detailed information, see Annex I). According to the Climate Action Tracker, global NDC pledges, if respected, are not sufficient to meet the goals of the Paris Agreement¹⁸. That is the first dimension of ambition. The second, equally important dimension rests on effective implementation of NDC pledges. Achieving implementation requires a stronger working relationship between planning, finance, and environment ministries. The end objective consists in helping all sectors develop and implement effective Paris-aligned investment portfolios.

In Latin America and the Caribbean, achieving sustainable development requires a combination of environmental and economic policies, and the needed mainstreaming of climate policy. This means that ministries of finance and planning need to be involved, especially if NDCs are to become an instrument that articulates domestic policy around multiple objectives and helps identify workstreams across sectors. The climate agenda is furthermore not distinct from the sustainable development agenda, which also includes oceans, biodiversity, and natural disasters (for more detailed information, see Annex II).

The overlap of these agendas requires polycentric (across ministries and different levels of governance from the municipal to the national) and interconnected international regimes. Regardless of coordination problems at

18 The Climate Action Tracker (<https://climateactiontracker.org/>) is an independent scientific analysis that tracks government climate action and measures it against the globally-agreed Paris Agreement aim of “holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.” A collaboration of two organizations, Climate Analytics and New Climate Institute, the CAT has been providing this independent analysis to policymakers since 2009.

BOX 3**The Transversal Nature of Climate and the SDGs**

The case of climate change in the implementation of the Sustainable Development Goals (SDGs) illustrates the interconnectedness of the climate and development agendas (see Figure 3.1). While there is a dedicated SDG for climate change action (SDG 13: climate action), it is easy to see the connections between SDG 13 and SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production), and SDG 15 (life on land). A World Resources Institute (WRI) working paper examined the objectives and goals of most iNDCs (first generation NDCs) and compared them to the 17 SDGs and their indicators, also known as targets (Northrop et al., 2016). Of the 169 SDG targets identified in this first generation, 154 reflected direct climate policy objectives in the first iteration of NDCs. There is a total of 247 SDG targets (231 when removing overlapping targets.) Climate is, without a doubt, the most transversal policy issue of the day. To tackle it, effective comprehensive climate governance frameworks need to ensure: (i) measured results and verification, including transparency, (ii) institutional coherence, (iii) effective planning; (iv) inclusive, participative co-construction approaches; (v) powerful visions that align all public, private, and civil society actors; and finally, (vi) the effective mobilization of concessional and non-concessional finance to anchor the agenda.

the international level, policy coherence opportunities must be leveraged domestically. Capitalizing on what has already been achieved in climate governance, and further strengthening national implementation frameworks for climate action will allow countries to better implement these other agendas from an SDG perspective. A considerable number of instruments and solutions must still be designed and tailored to the region's needs, but the path has already been cleared to interlock these agendas and their implementation efforts. The goals of achieving sustainable development and controlling climate change are lofty indeed. But linking the efforts may be the world's—and the region's— best chance to harness the wind.

Integrating Agendas: The Experience of Barbados

The Roofs to Reefs Programme (R2RP) adopted by the government of Barbados is a good example of a whole-of-government initiative that integrates mitigation and adaptation climate concerns with social policy and infrastructure resilience to natural disasters, such as hurricanes. With a strong participation by the Ministry for

Economic Affairs and Investment, the R2RP aims to improve the resilience of the housing stock and access to water and sanitation while eradicating pit toilets and promoting the use of solar and other green energy options to reduce dependence on fossil fuels. It also seeks to address direct line electricity transmission, improve water quality, and reduce the volumes and impacts of waste (both solid and liquid). These efforts are expected to lead to better living conditions and terrestrial and marine environments, including gullies and coral reefs.

To create an enabling environment to achieve the R2RP agenda, a range of regulatory provisions need to be either created or amended. The IDB's technical and financial support focuses on the most critical parts of that reform agenda.

As in many Latin American and Caribbean countries, architectural and engineering standards in Barbados have been replaced over time with less desirable practices. This shift is particularly concerning given the country's

BOX 4**The R2RP: Increasing Resilience with Five Types of Interventions**

Under the R2RP, building resilience in the low- and middle-income housing stock will include: (i) fortifying the roofs, windows, and doors of buildings, including low- and middle-income housing, to withstand up to Category 4 hurricane wind speeds (157 mph); (ii) furnishing grid-tied rooftop solar photovoltaic systems (with battery storage in the event of grid loss). Installation will be conducted under a to-be-established protocol/code to reduce the risk of losing the panels in an extreme wind event; (iii) installing modern rooftop rainwater harvesting systems and stormwater drainage to improve both water storage capacity and groundwater recharge rates; (iv) providing potable water storage systems to increase resilience to drinking water shortages; and (v) building modern, cost-effective, affordable household or communal wastewater treatment systems, with particular emphasis on nutrient removal/recovery (closing the nitrogen loop) to protect vital coastal reefs. To apply these measures consistently, a policy to retrofit and build up the resilience of low- and middle-income structures is needed in the medium term, as are guidelines to construct new climate resilient housing for these segments of the population.

exposure to extreme weather events. Under the R2RP, the Urban Development Commission (UDC) and the Rural Development Commission (RDC) will carry out a retrofitting program for vulnerable homes, including the replacement of pit latrines. The UDC and RDC are expected to execute the projects in accordance with recognized international and national standards covering such technical aspects as roof pitch and foundation type to ensure greater resilience of housing projects against hurricanes. New construction, as well as retrofitting and reinforcing existing structures in this manner would minimize the risks of overturning, uplifting, or sliding due to strong winds or water currents.

Integrating Agendas: Effective Mainstreaming in Colombia

Colombia's national submissions to the United Nations Framework Convention on Climate Change (UNFCCC) present another interesting case. Specifically, Colombia's National Adaptation Plan has an effective multi-sector governance framework that includes the national authority in charge of planning, the national hydrometeorological institute (IDEAM), the Ministry of the Environment (MADS), as well as the national system for disaster risk management (SNGRD). In turn, the SNGRD operates within an innovative governance framework that coordinates disaster reduction among civil society, public and private actors, strong national institutions, and weaker subnational authorities even as it supports the capacities of all participants. Indeed, these actors are not only important to manage disaster responses but

also to prevent them through upstream action as well as improved territorial planning. This working arrangement is supported by a solid regulatory and normative framework.

Finally, another virtue of Colombia's climate adaptation governance framework (SISCLIMA) is an effective multi-level coordination mechanism embodied in its national system for disaster risk management.

Another key actor in Colombia's SISCLIMA is its Financial Management Committee (Comité de Gestión Financiera). In 2018, it assessed the degree to which sectoral policies considered climate change policy. It concluded that the environmental, natural resources (particularly water), and energy sectors were the most effective in aligning their policies with the guidelines of the National Climate Change Policy of 2018.

In turn, these governance frameworks have led to concrete innovative interventions such as the use of nature-based solutions to improve the availability and management of water resources in the Chingaza watershed, which supplies Bogota's metropolitan area. Not only has this type of intervention helped develop new scientific knowledge on the benefits of nature-based solutions, but it has also helped better understand the impact of climate change on similar geographic areas. From a policy perspective, it helped generate better water-management tools that incorporate climate change into their planning while improving local municipal capacity.

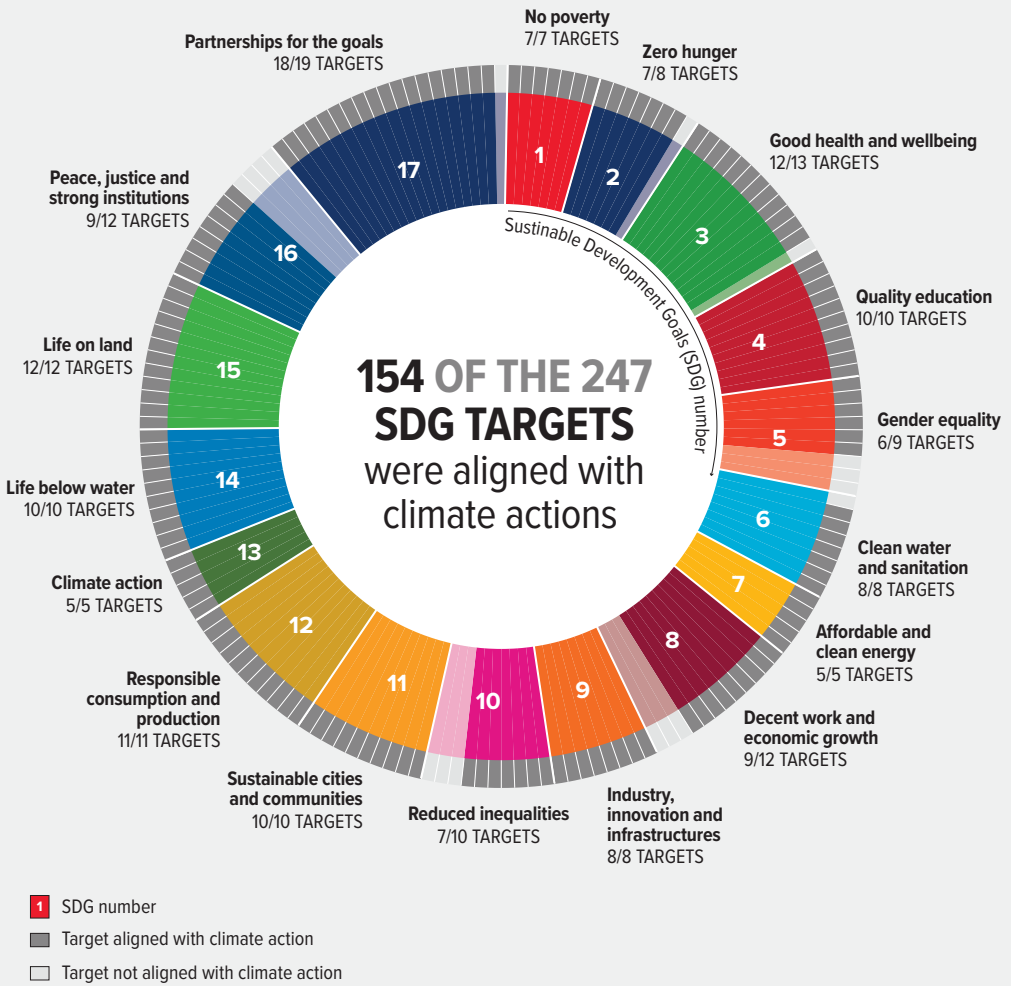
Looking at both mitigation and adaptation targets, the country's NDC priorities are reflected in its current National Development Plan (NDP) (Law 1955/2019), which addressed climate change through (i) a sustainability pact (*Pacto por la sostenibilidad*) for the expansion of clean energy, sustainable transport, and circular economies; (ii) an ambitious renewable energy effort that reviews targets under the Renewable Energy Law (1715/2014) and develops an energy transition roadmap; and (iii) promotion of electromobility solutions through a specific strategy as well as the Electric Mobility Law (1964/2019).

As in the case of adaptation, Colombia's multidimensional approach to climate governance has resulted in examples of successful implementation. The government built on the model of the Climate Investment Funds in which countries' finance ministries developed national climate investment plans to trigger transformational change and channel public and private finance towards sustainable growth paths.¹⁹ Replicating this approach, the government joined with the IDB and the United Kingdom's Sustainable Infrastructure Program (UK-SIP) to play a critical role in accelerating sustainable infrastructure development by strengthening national foundations and attracting private sector investments specifically aligned with Colombia's NDC. This program complements Bancolombia's leadership in issuing green bonds and Financiera de Desarrollo Nacional's objective of crowd-in private investments into infrastructure.

These actions illustrate how NDC's must not be perceived as instruments independent of existing policy planning frameworks; instead, their drafting and execution must involve all relevant ministerial actors to effectively mainstream climate policy (see Figure 3.2). Specifically, Colombia's example highlights the type of policies and private capital that may be unlocked by actively involving both planning and finance ministries. The results are clear: Colombia's updated NDC is not only more ambitious in terms of targets but also in terms of implementation mechanisms. By relying on effective upstream planning and private sector mobilization, it also results in an operational Long-Term Strategy (LTS), which the country can use as a guiding document in its future NDC iterations.

19 The Climate Investment Funds (CIF) were established in 2008. Through multilateral development banks such as the IDB, technical assistance is provided to countries in order to develop investment plans, advance mature project pipelines, and improve execution mechanisms that result in transformational climate policy.

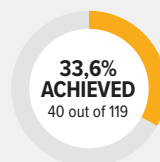
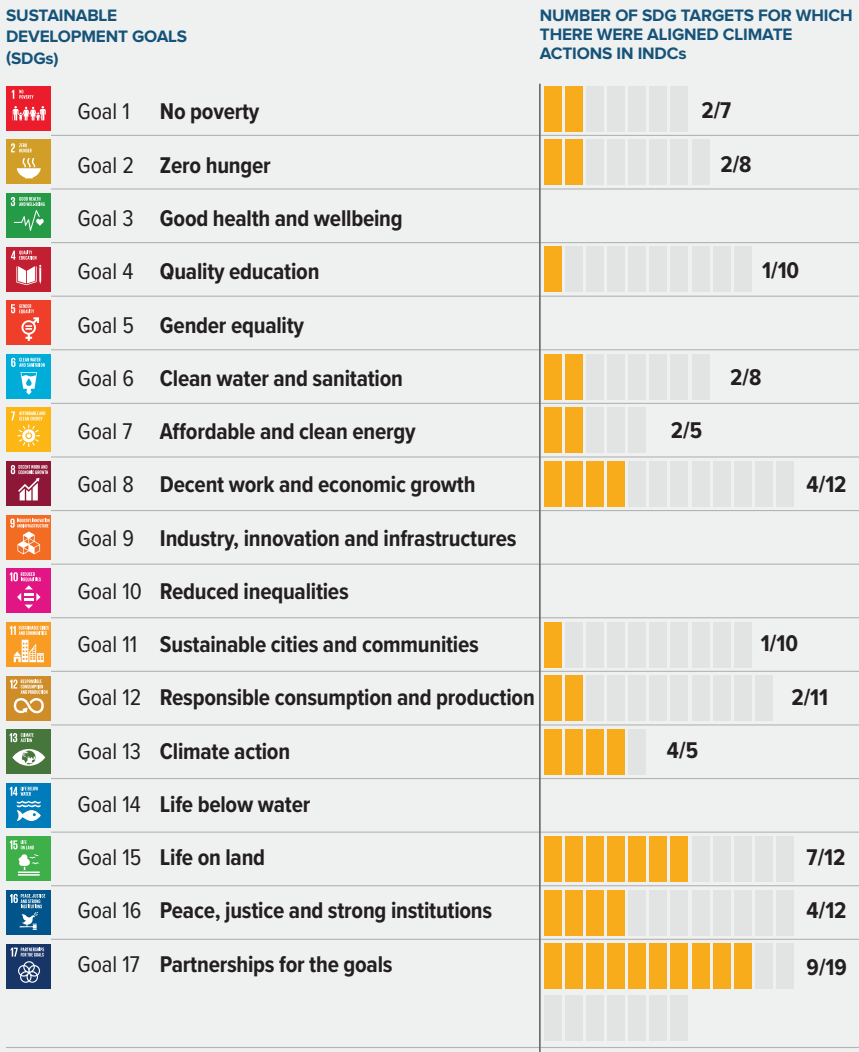
FIGURE 3.1.
Degree of Alignment between the SDGs and an Overview of iNDCs



SOURCE: Data from Northrop et al. (2016).

FIGURE 3.2.

Alignment between Colombia’s Intended National Determine Contributions (INDC) and the Sustainable Development Goals (SDG) targets



SOURCE: Reproduced with adaptations from Examining the Alignment Between the Intended Nationally Determined Contributions and Sustainable Development Goals, by Northrop, E., Biru, H., Lima, S., Bouye, M., and Song, R., 2016, World Resources Institute. CC BY 4.0

THE SECOND ROUND OF NATIONALLY DETERMINED CONTRIBUTIONS (NDCS)

A survey conducted by the IDB on the first and second iterations of NDCs reveals that in Latin American and Caribbean countries, more than 60% of first iteration NDCs were drafted quickly, and with minimal consultation. The private sector was typically absent from the deliberations prior to the 2015 United Nations Climate Change Conference (COP21). Also, more than 50% of NDCs failed to involve relevant ministries in the definition of sectoral targets. Government negotiators were asked to prepare their intended NDCs (iNDC) before the Paris COP21, which gave them little time to consult all pertinent sectors. Consequently, the iNDCs lacked policy coherence and effective multi-stakeholder ownership of the agenda. The intended targets became official NDCs when the Paris Agreement entered into force. Then, countries revisited them, updating sections of their initial NDCs after extensively consulting with relevant public sector actors. However, private sector involvement remained limited. In the same survey, all Latin American and Caribbean countries acknowledged taking measures to develop more ambitious second iterations.

In 2020, countries began to submit the second iterations of their NDCs. According to the survey, over 85% of countries involved sector ministries and other relevant stakeholders from the beginning, although with varying degrees of engagement that highlighted the need for greater policy coherence. Overall, NDCs benefit from high-level political support in most countries, which helps in the prioritization and allocation of public expenditures. However, understanding which coordinating mechanisms work best at generating effective, mainstreamed climate policy is a pending task.

Before the design of its first NDC, Uruguay developed a whole-of-government approach through a multi-sector coordinating mechanism, the National Climate Change Response System (*Sistema Nacional de Respuesta al Cambio Climático*). In its 2020 five-year budgetary law (Law 19.924), Uruguay also highlighted its intent to align public expenditures and economic planning with mitigation and adaptation measures to accomplish its LTS and NDC objectives while also prioritizing a green and sustainable economic recovery.²⁰ Argentina, Costa Rica, and Chile have adopted a national climate change cabinet strategy to coordinate efforts. Few countries take a strong subnational approach to ensure policy coherence and align states, regions, and more importantly, municipalities with efforts at the national level. Both adaptation and economic policy benefit from this subnational approach; indeed, as Chapter 10 explains, all politics is local. Chile and Colombia's subnational adaptation plans stand out as successful examples.

²⁰ See Uruguayan Law 19.924, section IV, subsection 36, paragraph 533.

Finally, most countries recognize the need for greater participation of the private sector, as well as unions and environmental NGOs. Establishing effective mechanisms to promote the participation of civil society—including youth—is a common challenge.

Only four surveyed Latin American countries included a financial strategy document in their NDC strategy (Secretaría LEDS LAC, 2020). And even within this limited group, the understanding of what a financial strategy should include varies greatly, ranging from a donor fundraising strategy to a document drafted jointly between the ministries of finance and environment. In some cases, ministries of finance did not even participate in drafting these financial strategies, raising doubts as to their effectiveness and further highlighting the need for true transversal ownership of the climate agenda and policy coherence among different sectors.

Ultimately, proper implementation of national commitments will require lead-

BOX 5

The Second Iteration of NDCs – More Work Remains to Be Done

As of January 8, 2021, 82 countries and the EU27 had submitted a revised version of their NDC to the UNFCCC. Approximately 40 of these corresponded to the second iteration of the country's NDC. A non-exhaustive review of these documents by the Climate Action Tracker reveals that of the 14 Latin American and Caribbean surveyed documents, only one (Brazil) did not present a more ambitious set of targets.* A quick survey of newly submitted NDCs in Latin America and the Caribbean revealed that a majority have established clear deadlines to attain carbon neutrality by either 2030 or 2050 at the latest.

While this is a positive signal regarding Paris Agreement compliance in the region, the Climate Action Tracker (2021) clearly indicated that even these new submissions fall short of the needed level of action. This is to be expected at this level, under the ambition mechanism of the Paris Agreement, as new, more ambitious NDCs are submitted. However, much remains to be done and ambition must be considered under the following three dimensions: (i) the definition of more ambitious targets; (ii) the design of implementation mechanisms that guarantee delivery of the objectives; and (iii) the consolidation of mechanisms to report and allow for verification of results.

** Such as in the case of US compliance towards the Paris Agreement between 2016 and 2020, this fact must be weighed against domestic action by other instances of both the Brazilian and US federal governments. While alignment between different instances is preferable, climate action by cities, provinces, states, and other subnational instances of government also merits attention.*

ership by key institutional players as well as unambiguous political signaling. Costa Rica and Chile offer regional examples of good practices that are being incorporated in the countries' second NDC iteration.

Costa Rica: An All-in Approach to Protect the Environment

By submitting the region's first decarbonization plan—including a Long-Term Strategy (LTS)—Costa Rica became a leader in the international climate regime.²¹ More importantly, the country adopted a governance framework to transform its NDCs—and the country's LTS—into effective, operational policies.

The case of Costa Rica highlights the role that strong messaging from the highest levels of government can play. After a strong commitment and signaling from the Office of the President and the President himself, the Ministry of Energy and the Environment (MINAE) produced Costa Rica's National Decarbonization Plan 2018-2050 in 2019 (MINAE, 2019). Critical to its success was MINAE's decision to reach out and work with all relevant sectors and ministries to generate sectoral approaches to decarbonization. Local universities also participated in developing models that helped identify the costs and benefits of various decarbonization strategies. MINAE guided the process, building allies and ownership in a whole-of-government approach. MINAE also incorporated civil society and private sector considerations, aided in this effort by the European Climate Foundation and the IDB through the Deep Decarbonization Pathways project (DDP-LAC).

Two critical actors in the design and subsequent implementation of the strategy were the Ministry of National Planning and Economic Policy (MidePlan) and the Ministry of Finance. Costa Rica's plan provides a transition roadmap to achieve net-zero emissions by 2050, with phased-in targets in all sectors and an actionable policy roadmap. MINAE's work with MidePlan and Finance resulted in (i) the definition of specific policy targets and (ii) MidePlan's commitment to design a planning document that incorporates decarbonization targets into the country's economic development plan and resource allocation process. Thus, decarbonization is effectively integrated with mainstream economic policies. Costa Rica's plan includes the evaluation of productive opportunities and public investment priorities to generate jobs, reduce poverty, and boost economic growth in a decarbonized future.

A key component of the plan revolves around a shift towards electromobility solutions while dealing with severe congestion problems, particularly in the country's capital, San José. These interventions are currently being designed and are expected to bolster the country's capacity to implement its LTS. Advanced intermediary projections reveal that decarbonizing the sector will bring net benefits of about US\$20 billion to the country by 2050, with lower operational costs, time saved in traffic, reduced health impacts, and fewer accidents. The plan also states that derived savings will be enough to compensate for the initially higher costs of a fleet of electric vehicles. The decarbonization plan was, in fact, complemented by a very thorough

21 Article 4, paragraph 19 of the Paris Agreement mentions the need for developing what are known as Long-Term Strategies (LTS). Article 4, paragraph 19 also refers to Article 2, paragraph 2 which recognizes the existence of common but differentiated responsibilities (Paris Agreement to the United Nations Framework Convention on Climate Change, 2015).

cost-benefit analysis developed jointly with the IDB that helped guide its main workstreams (Groves et al., 2020).

From a national climate governance perspective, the Ministries of Finance and MidePlan are implementing the plan through a high-level coordination body, where MINAE and the office of the President of Costa Rica also participate. This body is tasked with reviewing, aligning, and prioritizing public development processes, and providing complementary guidance to government structures that need to integrate the objectives of decarbonization across all sectors.

Finally, to help operationalize the LTS, the Ministry of Finance uses the plan to coordinate and prioritize access to concessional finance as well as grants from international donors and international financial institutions. Thus, Costa Rica's international development agenda is interlocked with a country-driven sustainable growth vision.

Chile: Linking Environmental and Socioeconomic Policy

In April 2020, Chile became the second Latin American and Caribbean country (after Suriname) and the seventh in the world to officially submit the second iteration of its NDC. While presenting its NDC, the Minister of the Environment called for it to play a significant role in addressing the underlying social crisis in the country and emphasized the role of social policy in the economic and sustainable recovery plans needed to address the Covid-19 crisis. Chile's leadership is an example on several fronts. The establishment of an independent national scientific body that formulated science-based recommendations not only provided the most advanced sectoral perspectives on policy and technology, but also identified overlap with other relevant agendas. Chile's NDC recognizes the need to act on both oceans and biodiversity protection as part of the climate action domain. Indeed, Chile's NDC goes beyond the traditional adaptation and mitigation policy intervention proposals to include more comprehensive policy requirements for oceanic and coastal wetland conservation. The NDC also highlights the environmental and socioeconomic opportunities inherent in circular economy, forest, and peatlands management.

This comprehensive approach to a climate-driven policy that goes beyond traditional environmental policy allowed the country to define an advanced carbon budget for the next decade, which may now be used in the policy-making process.

Another example of Chile's leadership includes the creation of the Inter-Ministerial Technical Team on Climate Change (Equipo Técnico Interministerial para el Cambio Climático). This is an inter-ministerial body for policy coordination that meets at the technical level to discuss policy

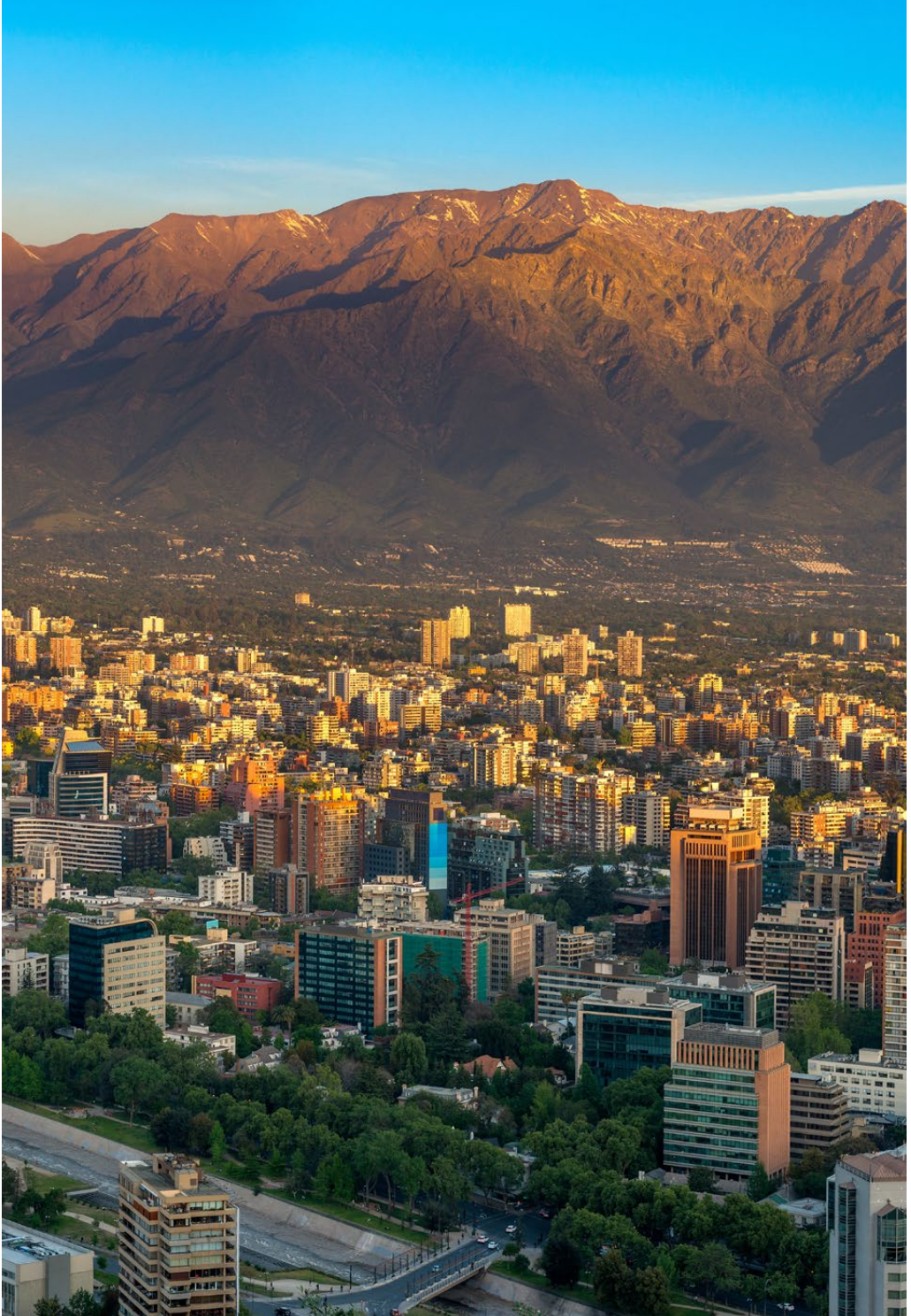
opportunities. This multisectoral coordinating arrangement set up by the Ministry of the Environment aims to create ownership of the climate agenda throughout government.²²

From a climate action perspective, the country has the most advanced electromobility agenda in the Americas, as well as an earlier-than-expected phase out of coal energy generation plants. Support from the International Labor Organization (ILO) and the IDB, as well as the design of innovative financial models involving the private sector, ENGIE, IDB Invest, and the Climate Investment Funds were instrumental in the plan to transition away from coal.

While Chile's NDC offers room for improvement, the process by which it was updated as part of the ongoing design of its LTS warrants consideration by other countries in the region. Of course, some of the limitations of the second NDC reflect more complex, ongoing debates at the national level. Responding to the 2019 wave of social unrest in the country, the Ministry of the Environment not only strengthened civil society participation, but also infused the NDC with a strong, transversal social pillar that provides guidance to ministerial and civil society actors, as well as other relevant public and private sector actors on how to align climate policy with overall socioeconomic development goals. Acknowledging the importance of socioeconomic conditions as a driver of the decarbonization process is explicit in the country's NDC. Subsequent chapters delve into this issue in detail to understand the political economy factors shaping successful climate policy.

In conclusion, these four case studies provide examples of how more ambitious NDCs are being developed in the region. At their core is the decision to address social and economic growth issues while including climate policy through the planning and public finance prism rather than just environmental policy.

22 Chile has developed an ecosystem of multisectoral coordination bodies at different levels of the governance hierarchy, such as the Council of Ministers for Sustainability (CMS), the Monitoring, Reporting and Verification Technical Team (ETMRV, acronym in Spanish), and the Regional Climate Change Committees (CORECC, in Spanish.)



CHAPTER 4

DECARBONIZATION STRATEGIES: LINKING ENVIRONMENTAL AND SOCIOECONOMIC CONCERNS

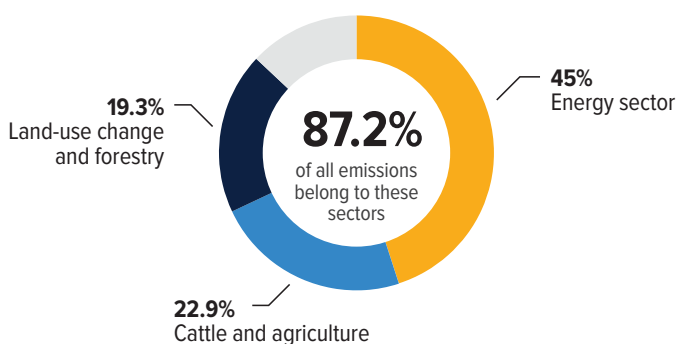
After reviewing the region's vulnerability profile as well as concrete examples of how successful climate policies can address both mitigation and adaptation while focusing on sustainable economic development, this chapter reviews the region's priority sectors for developing decarbonization strategies.

ON DECARBONIZATION IN LATIN AMERICA AND THE CARIBBEAN

While the region is highly vulnerable to climate change, and regional policy-makers face political incentives to address environmental vulnerabilities first, both mitigation and adaptation efforts may be implemented when effective transversal planning frameworks are in place. NDCs belong within these frameworks. Moreover, as parties to the Paris Agreement, all countries in the region must contribute to the global momentum for climate action. In many cases, the international imperative is connected to domestic policy concerns; for instance, the access of agricultural products from the region to other markets is being conditioned on the adoption of low-carbon agriculture measures.

Decarbonization is the process by which growth is decoupled from the main driver of anthropogenic climate change: greenhouse gas (GHG) emissions.²³ While some GHGs are short-lived (black carbon, methane, tropospheric ozone, and fluorinated gases), carbon dioxide (CO₂) and nitrous oxide (N₂O) are significantly more important in terms of concentration in the atmosphere. While most methane (CH₄) has an estimated half-life of 9.1 years in the atmosphere (IPCC, 2013), between 65% and 80% of emitted CO₂ will linger in the atmosphere for up to 200 years (Ehhalt et al., 2001). On the other hand, CH₄ has a Global Warming Potential (GWP) equivalent to 84 times that of CO₂, making it a priority target for mitigation in a region where agriculture produces it in large quantities. Policymakers should consider both GHG half life and GWP when designing their decarbonization strategies. (see Figure 4.1). Thus, climate change is caused not only by current carbon-intensive activity, but

FIGURE 4.1.
Regional GHG Emissions by Sector



SOURCE: Data from Bárcena Ibarra et al. (2020)

also by the concentration of GHG emissions that occurred in the past. These concentrations will keep increasing as long as emissions are positive and will only begin to diminish over time once emissions are brought to zero.

Achieving the goals of the Paris Agreement and committing to limit the temperature increase to either 1.5°C or 2.0°C (UNEP, 2019a) will require reaching net-zero emissions between 2050 and 2070 (Hoegh-Guldberg et al.,

23 The main GHGs to consider are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). GHGs have different global warming traits; they are compared through the adoption of a CO₂ warming equivalent, or CO₂eq.

2018). It is particularly important to underscore, especially for Latin America, that attaining net-zero emissions entails developing practices that remove GHGs from the environment, such as afforestation or planting new forests.²⁴ Achieving net-zero emissions while improving standards of living is possible but requires developing what is known as just-transition policy frameworks.

While Latin America and Caribbean nations often explain that the region is not a significant emitter of GHG, accounting for only 8.3% of global GHG emissions in 2016 (Bárcena Ibarra et al., 2020). WRI data shows a different picture when considering per capita emissions.²⁵ The region is, however, disproportionately vulnerable, as shown in Chapter 2. Besides traditional postures at the UNFCCC, confronting climate change is not the only reason for advancing decarbonization efforts, which can also contribute to economic growth, competitiveness, and better health. The question becomes, therefore, how the region should engage in the process of mitigation (reduction of emissions), while ensuring that adaptation strategies are adequately implemented. Increased renewable energy capacity helps reduce emissions while making sense from a cost and employment perspective. In cities, which account for 70% of GHG emissions (ONU-Hábitat, 2011), adopting electromobility solutions such as electric buses in mass transport systems helps reduce emissions and improve air quality, an important driver of health outcomes. UNEP (2019b) look into detail at the existing regional policy options that can lead to the full decarbonization of the power and transport sectors. Decarbonizing agriculture can also boost competitiveness and health standards through innovation.

CRITICAL SECTORS FOR MITIGATION

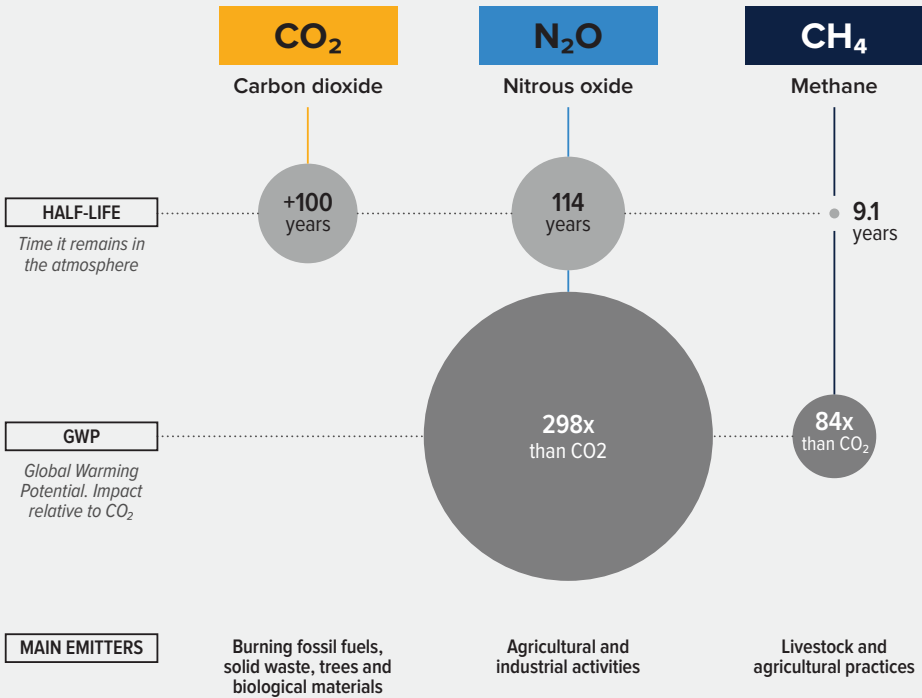
As shown in Figure 4.2, three sectors represent 87.2% of all GHG emissions in Latin America and the Caribbean (Bárcena Ibarra et al., 2020): (i) energy (generation and use), which includes transportation, industrial processes, and construction (45.3% of all GHG emissions); (ii) cattle and agriculture (22.9% of all regional GHG emissions); and (iii) land-use change and forestry (19.3% of emissions). While the region's share of emissions from the energy sector is lower than the global average (45.3% versus 70.4%), the sector's emissions have also grown the fastest, for reasons pertaining to the economic boom that the region enjoyed as a result of the high commodity prices of the early 2000s. (see Figure 4.3).

24 Afforestation is differentiated from reforestation activities to measure new net interactions in the carbon cycle.

25 WRI (2020) data shows that for the 2000 – 2018 period, per capita tCO₂e emissions in LAC were slightly above the world average (5.17 tCO₂e for LAC versus 4.93 tCO₂e for the world) but substantially below those of G20 nations (8.38 tCO₂e). In fact, these averages omit great differences in economic and social development levels throughout the region. LAC nations also quote the common but differentiated responsibilities (CBDR) principle which is also inscribed in the Paris Agreement.

FIGURE 4.2.

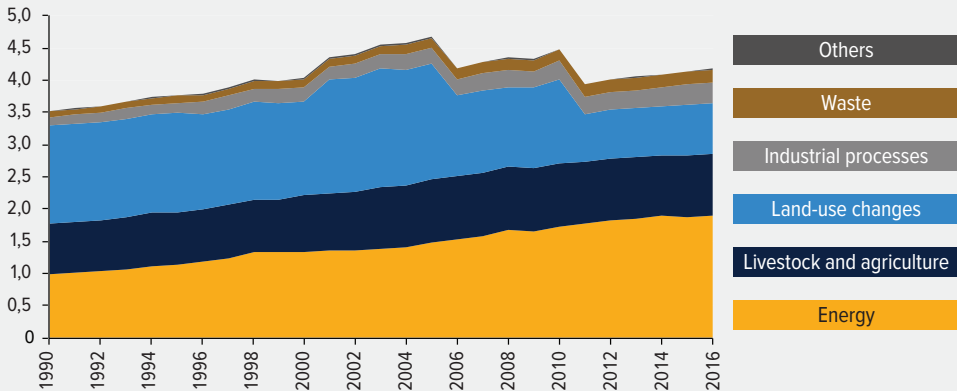
Half-Life and Global Warming Potential of Greenhouse Gases



SOURCE: Data from Shine et al. (2005)

FIGURE 4.3.

Greenhouse Gas Emissions in Latin America and the Caribbean, 1990-2016
(gigatons of CO₂ equivalent)



SOURCE: Reprinted from *La emergencia del cambio climático en América Latina y el Caribe: ¿seguimos esperando la catástrofe o pasamos a la acción?*, by Bárcena Ibarra, A., Samaniego, J., Peres, W., and Alatorre, J. E., 2020, Libros de La CEPAL, N°160(LC/PUB.2019/23-P).

As a result, emissions from the electric generation subsector rose by 71.1% between 2000 and 2016, while emissions from the transport subsector rose by 48.5% (Bárcena Ibarra et al., 2020). On top of economic growth, high energy subsidies played a role. These subsidies reached 1.8% of GDP between 2011 and 2013 in Latin America and the Caribbean (Balza et al., 2016), with 1% of GDP for fuel and 0.8% for electricity (Di Bella et al., 2015). It is reasonable to question the efficiency of fossil fuel subsidies in Ecuador and Venezuela where they reached 7.1% and 7% of GDP, respectively in 2013.²⁶ Given the region's fiscal constraints and the additional fiscal burden of Covid responses and economic recovery packages, the relevance of these subsidies should be reviewed.

Generalized fossil fuel subsidies in the region contribute directly to urban sprawl, which renders mass transportation less effective and often results in higher emissions due to greater use of personal vehicles. Understanding the real impact of inefficient fossil fuel subsidies as well as policy solutions to mitigate them should be a priority for ministries of finance. Instruments such as direct conditional and unconditional cash transfers offer governments more targeted and cost-efficient approaches to help lower-income households. Emissions from land use change and forestry sectors are more than three times larger in Latin America and the Caribbean than in the rest of the world (19.3% vs. 5.8% of total GHG emissions). The sectoral share of livestock and agriculture in the region doubles that of the world. Agricultural emissions of GHG increased 100% between 1961 and 2010 (FAO, 2014) primarily due to the rise in extensive grazing systems in South and Central America. The challenge is to enact targeted programs and policies that support a transition towards a sustainable intensification of livestock production while expanding the livestock frontier. A proper decarbonization strategy must include tailored solutions from subsistence agriculture to technological intensification for competitiveness and further global integration.

RETHINKING THE REGION'S CLEAN ENERGY MATRIX

Although Latin America and the Caribbean's energy matrix is mostly clean, significant challenges must still be addressed to successfully decouple economic growth from GHG emissions.²⁷ The preponderant role of hydropower explains why the region has a cleaner energy matrix than the rest of the world. In 2013, hydropower represented 49% of all electric generation in the region (World Bank, 2019a). As discussed, this also generates a vulnerability:

26 Recent efforts to remove these subsidies in Ecuador, and the successful negotiation between national authorities and indigenous communities also raise the issue of political economy considerations to successfully achieve these policy outcomes.

27 The relevance and use of carbon pricing are discussed in the next chapter.

changes in precipitation and weather patterns are already impacting this installed capacity. In 2001, changes in climate patterns cost Brazil one point of GDP and led to energy rationing for eight months. Similarly, Colombia faced complex power generation decisions in 2016 when droughts from El Niño led to a drop in hydropower's generation capacity from 70% to 61%. The reliance on hydropower is also complicated by the fact that cost-effective locations for hydro are mostly tapped-out, severely constraining the resource's potential (ABN AMRO, 2018).

Developing other renewable power sources is then critical, not only to meet Paris Agreement commitments, but also to design complementary energy supply strategies. No fewer than 18 of 26 NDCs in the region include non-hydro renewable energy strategies and targets. In September 2019 at the U.N. Secretary General's Climate Action Summit in New York, nine countries led by Colombia set a collective target of 70% renewable energy use by 2030.²⁸

However, the share of renewable energy fell between 1990 and 2016 from 64% to 55%. This decline was mostly due to an abundant supply of natural gas, combined with international energy price trends, and a shift from oil-fired thermopower generation to gas powered plants which helped sustain expansions in urban and rural electrification. And yet, while remaining significantly small, nonconventional renewable energies (NCREs) grew the most (34%) over the last decade (Balza et al., 2016).²⁹ This trend was also driven largely by a steep drop in generation costs. In fact, declines in costs for these alternative renewables have been steeper than for hydropower (Ferroukhi et al., 2016). More importantly, generation costs for nonconventional renewables are now competitive with fossil fuels, and investments in the region exceeded US\$80 billion between 2010 and 2015 (Ferroukhi et al., 2016). In Chile, competition has driven the average price of bids down from US\$130/MWh to US\$47/MWh in a few years (ABN AMRO, 2018). Auctioned regional average prices for solar energy supply plummeted by 87% from 2009 to 2017 and wind energy prices dropped by 37% from 2008 to 2016 (Viscidi and Yepez, 2018). Investments in renewables, per capita consumption patterns, energy import dependency, and natural energy resource endowment vary greatly throughout the region (Viscidi and Yepez, 2018).

Needed policy solutions are, however, similar. A solution to Central America's reliance on hydro and its extreme vulnerability to climate has been taking shape with the Central American Integration System (SICA) and the creation in 2013 of a regional energy market among the participating countries (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama). Investments in the region's multiple, disconnected grids are critical. Not only is it necessary to expand existing grid capacity and facilitate

28 Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, and Peru.

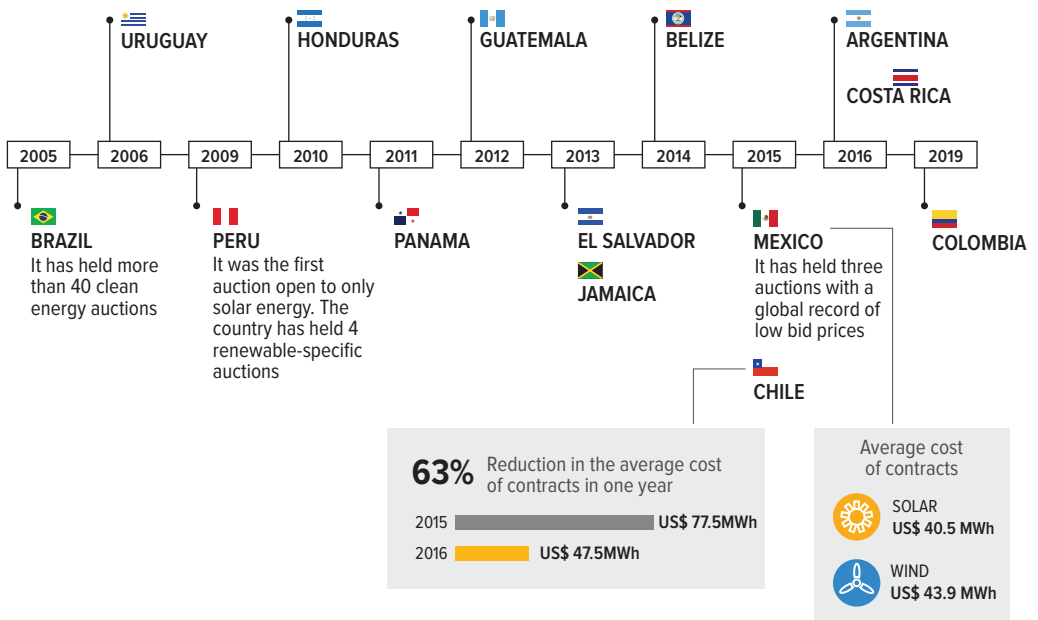
29 NCRE refers to solar, wind, geothermal, tidal, biomass, and small hydroelectric plants.

interconnection but upgrading to smart grids will also allow further integration and investments in renewables.

While SICA sets a good example of the type of investments required to physically integrate power grids, it also highlights the need for economic integration through the harmonization of norms, standards, and other regulations as well as coordinated price mechanisms. Macroeconomic risk factors such as exchange rate volatility as well as the industrial organization of the energy sector also limit the growth of renewables. Solutions like long-term electricity forwards (or power purchase agreements, PPAs) play a role in addressing these problems, which also hedge against pricing obstacles, including fossil fuel subsidies. As early as 2006, Brazil and Uruguay pioneered clean energy auctions, which have proven to be effective market-driven approaches to boost the development of renewables. Renewable energy auctions require, however, clear signaling from governments, including on future auctions, pricing guidance, and regulatory information. Colombia's first renewable energy auction in 2019 merits consideration (see Figure 4.4).

Enabling access to finance is also critical as evidenced by the mandates of national development banks like Bancoldex (Colombia), BANOBRAS (Mexico) or BNDES in Brazil, and specific infrastructure funds like FONADIN

FIGURE 4.4.
Latin American and Caribbean Timeline of First Clean Energy Auctions by Country

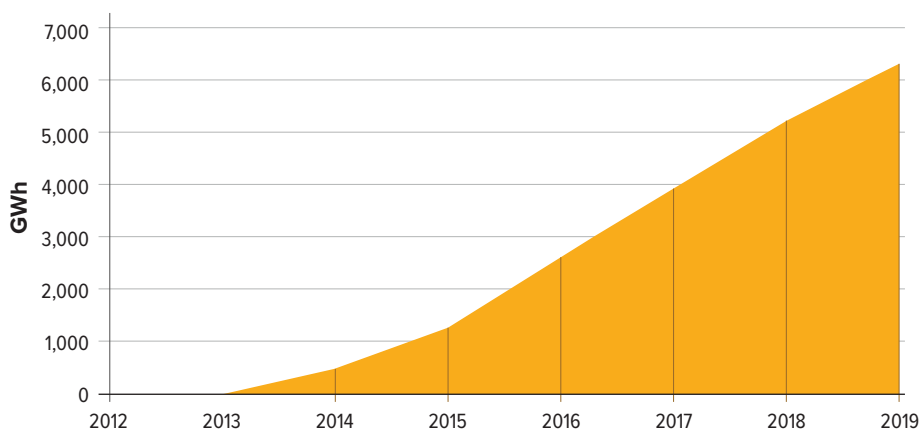


SOURCE: Data from Viscidi and Yopez (2019); Boggs (2016).

in Mexico. National Development Banks can help push the development of renewables as a hedging mechanism against uncertainty derived from import-risk in gas and other sources of energy. In the mid-2000s, Chile imported gas from Argentina to compensate for gaps in its generation capacities. Lack of price coordination and instability in Argentina's supply of gas to Chile generated shortages that led to the launch of Chile's Non-conventional Renewable Energy (NCRE) policy. The country quickly met its initial targets for renewable energy generation and has since revised them with increasingly more ambitious ones. The Chilean NCRE policy faced multiple difficulties such as minimal interest on the part of traditional utilities, private sector partners who often lacked knowledge of the potential risks in this "new sector," and long project payback periods of 8 to 9 years on average (Moguillansky, 2016). These projects also faced multiple complications in distribution and logistics with long distances between generation and consumption centers and poor grid conditions.³⁰

To support the National Strategic Solar Industry program, Chile's Ministry of Economy tasked CORFO to create targeted, dedicated, large, and small credit lines to help local providers partake in the value-chain of the photovoltaic industry and reduce imports in goods and services (Griffith-Jones & Ocampo, 2018). To complement the domestic policy, the IDB and World Bank supported a series of programs through the Climate Investment Fund's Clean Technology Fund. CIF funds were also used to promote the scaling up of renewable energy self-supply and energy efficiency for individual

FIGURE 4.5.
Solar Photovoltaic Electricity Generation, Chile 2012–2019



SOURCE: Reprinted from *World Energy Outlook 2020*, by IEA, 2020, <https://www.iea.org/reports/world-energy-outlook-2020>. All rights reserved.

30 Most generation of photovoltaic energy is located in the Atacama Desert, which is close to large industrial mining centers but far from larger population hubs.

end-users. While some think CORFO could have been capitalized to further push the development of NCREs, the program can be considered a successful example of support to an emerging but competitive industry (see Figure 4.5). Ultimately, the deciding factor in developing NCREs has been lower costs and price signaling. Chile's NCRE boom and its historic agreement with ENGIE to phase out all coal plants was price driven.

AGRICULTURE, FORESTRY, AND LAND USE: SMALL IN SCALE, BIG ON IMPACT

While agriculture, forestry and land use (AFOLU) activities contribute less and less to regional GDP, their share of GHG emissions will continue to increase if no action is taken. Afforestation and reforestation will play a critical role if the region is to meet its Paris Agreement commitment. Yet, at the same time, high poverty rates among rural populations must be reduced.

Lack of enforcement of conservation regulations, weak institutions, land property problems, and greater cattle and livestock consumption spurred on by economic growth have contributed to expanding the agricultural frontier, resulting in lower forest cover and higher emissions. In turn, an excess of nitrates and nitrogen in fertilizers contributes directly to GHGs and indirectly through algae bloom spurs and their ensuing emissions. Many of these issues may be addressed, some through cost-effective nature-based solutions.

Costa Rica demonstrates how reforestation can help achieve Paris Agreement objectives. While the country's forest cover represented 77% of its land area in 1943, crop production and cattle raising cut it to 41% by 1986 (Hanson et al., 2015). Reforestation through natural regeneration on abandoned pastures boosted forest cover back up to 48% in 2005 (Calvo-Alvarado, 2009). By 2010, the government of Costa Rica estimated its woodlands at 52.4% (FONAFIFO, 2012). Some key success factors included a strong institutional context, fiscal and financial incentives for reforestation, conservation measures such as payment for environmental services, cattle ranch subsidy reform, and a historically strong enforcement and focus on land titles that favored the restoration of lands (Hanson et al., 2015).

Uruguay offers another interesting case. Responsible for what may seem to be an insignificant 0.0538% of global GHG emissions, a staggering 73.8% of the country's emissions come from the agriculture sector (WRI, 2020).³¹

31 Including land use change and forestry. In 2016, the country was responsible for 0.02% of global CO₂ emissions.

Moreover, the farm sector contributed 32.8% of all exports, which in turn represented 21.4% of GDP in 2016 (OEC, 2020). Thus, for the Uruguayan agricultural sector, decarbonization is not just an environmental issue but an economic competitiveness one as well. The technification of farming and added value from the country's innovation policies and agencies offer great opportunities to reduce emissions which, in turn, means a more competitive product to position in other markets. Innovation also plays a role. A country like Uruguay, which is characterized by a strong public and private sector innovation ecosystem, is ideally poised to conduct agricultural research on low-carbon agricultural practices such as natural feed supplements that reduce methane emissions from the enteric fermentation of ruminants. Such research is behind Swiss company Mootral's food supplement to limit the methane emissions from the digestive process of these animals. Although the science is young, many opportunities as well as limitations still exist (Alvarez-Hess et al., 2019). Domestically, the promotion of sustainable land management policies and nature-based solutions may also help reduce algae blooms and their health consequences at lower costs (O'Connor et al., 2019).

More importantly, reducing the cattle and livestock production chain's carbon footprint must be viewed as a competitiveness issue for a region that produced 16% of total global food exports in 2015 (Rabobank, 2015). Indeed, new developments such as the EU–Mercosur Agreement and export reliance on bovine products must be evaluated in light of current global climate considerations. The President of France and the Chancellor of Germany sent strong signals when they announced that bovine exports from the region would be conditioned on the adoption of low-carbon agriculture practices in the bovine supply chain. Similar signals from the United Kingdom only reinforce the need for Latin American and Caribbean producers and governments to invest in research and innovation and to act on the carbon intensity of its food products. In fact, it would not be the first time the region has had to adjust its policies and practices to access the European market. In the mid-1990s, Ecuador and Colombia had to adapt to comply with human, social, and environmental regulations to access the European flower market (OECD, 2006). More recently, the EU established a single common energy label, which affected the export of manufactured energy-dependent goods. In the case of beef and agricultural products, France and the EU are expected to insist on adopting and strengthening existing norms for the traceability of livestock and agricultural goods, including their carbon footprint (Jaouen, 2019). Anticipating such trends, the Brazilian private sector has already begun investing in the decarbonization of the bovine meat supply chain. Decarbonizing value chains and increasing transparency and traceability of a product's carbon footprint is important for economic integration. Chapter 10 discusses how policymakers in Latin America and the Caribbean must also cater to a significant constituency that increasingly values environmental goods and services. These domestic concerns translate into new political incentives that policymakers must consider when designing policies. They are also aligned with existing commercial

signals that create further incentives to decarbonize the productive units of the agricultural sector.

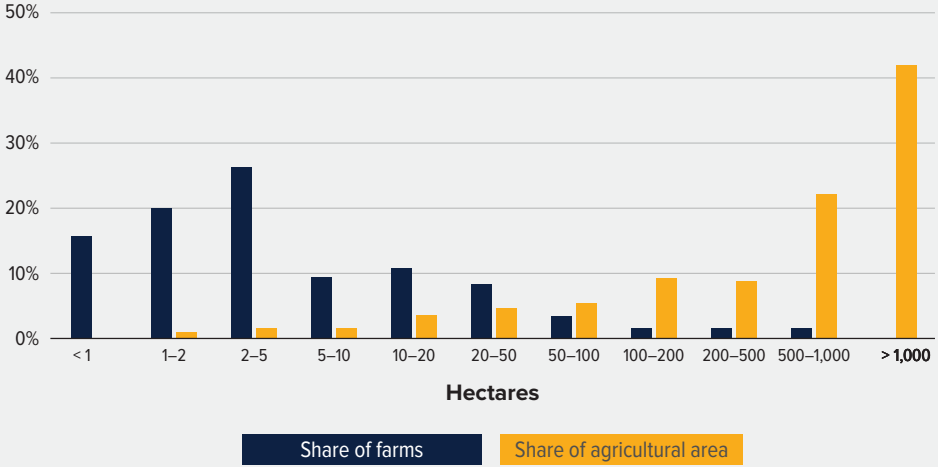
In Mexico, research on the work of the national commission for forests (CONAFOR) shows that forest management and reforestation are possible, but that over time and with changing political administrations, it is necessary to adapt and develop tailored local solutions that consider sociocultural, economic, legislative, and institutional factors (Torres-Rojo et al., 2016).

As already noted, half of the region's food is produced by nearly 14 million farmers in small to medium agricultural production units. These farmers are often located in isolated rural areas where poverty abounds. Lack of finance and proper infrastructure is compounded by limited knowledge of sustainable farming practices and high rates of financial illiteracy. Insufficient access to digital services and technologies further widens the gap between the rural poor and more urban populations of Latin America and the Caribbean.³² In turn, these factors compromise productivity and competitiveness because rural producers cannot adapt to the changing climate or invest in more productive approaches. Support to this group must focus on both economic competitiveness and social development. Rural Sustentável, a joint IDB–UK DEFRA pilot to support Brazil's low carbon agriculture program, is an example of how some of these problems can be solved. The low-carbon agriculture project, Rural Sustentável, launched in 2013, helps Brazilian farmers improve their lands and forest management to promote sustainable rural development, reduce poverty, conserve biodiversity, and protect the climate. In alliance with the Ministry of Agriculture, Livestock, and Supply, this IDB project is implemented by the Brazilian Institute for Development and Sustainability with funds from the United Kingdom's Department of Environment, Food, and Rural Affairs, and the support of Banco do Brasil and Embrapa. This US\$30 million project used US\$20 million in non-reimbursable financial benefits for rural producers, the most vulnerable to climate change, and it is the largest of its type in Latin America. Rural Sustentável has positively impacted and directly benefited 18,570 people and has prevented the degradation of 36,038 hectares and the deforestation of 8,550 hectares. This has directly led to a reduction of 8.9 million metric tons of carbon dioxide equivalent and indirectly to a reduction in emissions of an additional 57 MtCO₂e.

Agricultural production was the second source of GHG emissions in Brazil (32.6%) in 2019 (USAID, 2019). As in the rest of the region, derived emissions are expected to grow on par with production to meet national, regional, and international demands. In this context, Brazil established a program centered around low-interest credit lines for rural areas. The purpose of

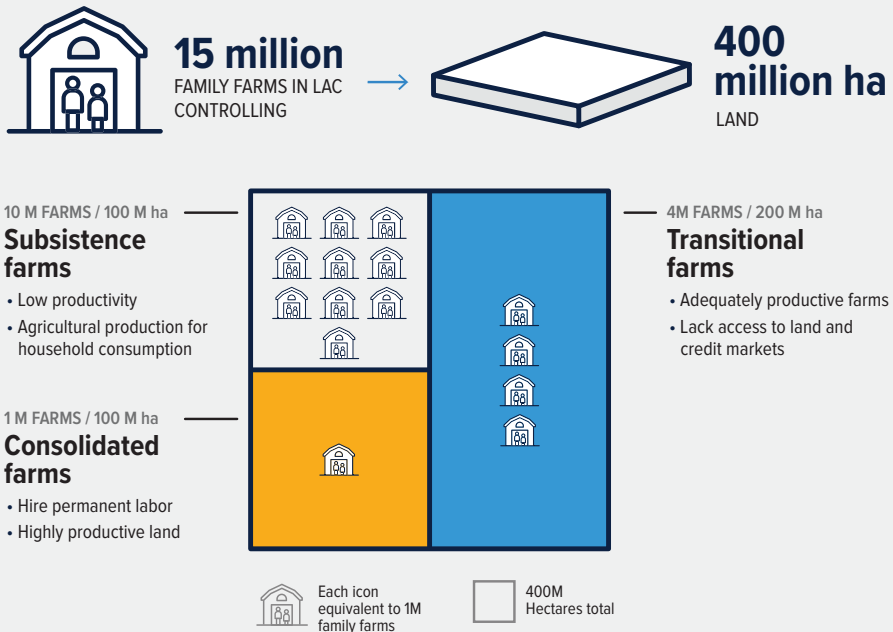
32 It is also worth noting that the full effect of a digital transformation in LAC and its effect on GHG emissions will be dependent on the region's energy matrix, while the full environmental effect needs a value-chain analysis to understand its whole impact. It is also worth noting that little information exists regarding efficiency and emission reduction gains that arise from digital transformation versus emissions increases that arise from further adoption of digital transformation. However, this issue becomes insignificant when considering a fully renewable energy matrix. In this scenario, the LAC region stands to gain from a competitiveness perspective, considering its energy grid.

FIGURE 4.6.
Number of Farms and Farmland by Land Size in Latin America and the Caribbean



SOURCE: Reprinted from The number, size, and distribution of farms, smallholder farms, and family farms worldwide, by Lowder, S. K., Scoet, J., & Raney, T., 2016, World Development, 87, 16–29. CC BY-NC-ND 4.0

FIGURE 4.7.
Heterogeneity Among Smallholder Farmers and Farmland Distribution



SOURCE: Data from Frankfurt School et al. (2019); Berdegué and Fuentealba (2011)

this program was to facilitate the adoption of practices and technologies with GHG mitigation co-benefits while supporting better forest management practices. A study of Rural Sustentável outcomes (Newton et al., 2016) shows good results but also reveals the following insufficiencies: (i) limited communication among targeted farmers of the program and its benefits; (ii) inadequate knowledge of how to implement low-carbon solutions combined with scarce training resources; (iii) insufficient training of bank personnel that may have hindered loan approval rates; and (iv) limited access to credit.

FAOStat indicates that of the 20.4 million farms in the region, 81.3% are smallholder units, occupying 23.4% of farmland (OECD/FAO, 2019). These farmers benefited up to 2014 from lower rural poverty rates, but have since faced the consequences of climate change and other factors that have led to an overall net resurgence in rural poverty.³³ (see Figures 4.6 and 4.7). Ultimately, the first urgency is to strengthen and develop social safety nets to boost the resiliency of the rural population to adverse climate events. An illustration of a no-regrets mitigation scenario is the use of sustainable forest management practices that also result in GHG mitigation co-benefits.

Similar results can be achieved through the green school environmental program launched by Honduras that trains rural youth in sustainable practices (Secretaría de Recursos Naturales y Ambiente Honduras, 2017). In Brazil, the Roberto Marinho Foundation has helped socially vulnerable students by developing and implementing a curriculum coordinated by national and state authorities to strengthen basic education and complement it with courses that build up useful employment-driven skills and competencies related to sustainability practices (Roberto Marinho Foundation, 2020).

Solutions for the 18.7% of farms that represent 76.6% of agricultural land include technifying agricultural processes and the rest of the value chain (Leporati et al., 2014). Specifically, the focus should be on one of the pillars of Rural Sustentável: attracting private financial flows. Indeed, policies that lead to the crowding-in of private capital to decarbonize agricultural production are critical to achieve the region's objectives.

In this context, the United Nations Convention to Combat Desertification (UNCCD) has developed an impact investment fund for land degradation neutrality: the LDN fund. After a competitive process, a private sector management firm (Mirova, of Natixis Investment Managers) was selected during COP21 in Paris to manage a US\$100 million fund from public, private, and philanthropic sectors (UNCCD, 2020). The fund's objective is to invest in financially viable private projects that focus on sustainable land management and land rehabilitation including sustainable agriculture, livestock management, agro-forestry, and forestry. The fund, which became operational at the end of 2018, made its first investment in Latin America and the Caribbean in 2019 and focused on four coffee cooperatives in Peru. It is expected

33 Rural poverty rates were heavily affected by poverty-induced migration from rural to urban areas (Möllers and Meyer, 2014).

BOX 6**Implementation of Rural Sustentável**

Implemented in seven states through 70 municipalities in the Amazon and the Atlantic Forest, the Rural Sustentável project helped boost small and medium farmers' production and income. The technologies supported brought positive results and socioeconomic benefits in all dimensions of sustainable development. The project increased production efficiency with low-carbon practices, sustainable rural development, poverty reduction, biodiversity conservation, and climate protection. First, it provided access to information through demonstrative units, field days, training, and distribution of didactic and informative materials. Secondly, producers were offered financial incentives to implement one or more of the four agricultural practices promoted by the project. Thirdly, training opportunities were provided for local technical assistance agents who monitored all producers during implementation. Technical assistance is a critical factor for sustainable rural development, and the project should continue to enhance it by training rural technicians. Difficulties such as assisting agents' lack of initial knowledge of the potential of low carbon emission technologies were addressed through courses and tutorials developed under the project.

The Low-Carbon Agriculture Project has contributed to developing a fairer rural environment with more equality, preservation, and sustainability. More information on the project is available on the project's website: <http://www.ruralsustentavel.org>.

to result in the reforestation of 9,000 hectares of degraded land while reducing CO₂ emissions by 1.3 million tons and improving the livelihoods of 2,400 producers. The LDN also leverages IFIs such as IDB Invest, which provide first-loss protection for senior investors, thereby encouraging the involvement of private investors as sustainable land use projects are often associated with higher risks.

The LND fund is not the only initiative that considers sustainable land management a financially sound avenue for sustainable development and climate action. The 20x20 initiative encompasses 17 Latin American and Caribbean countries that aim to restore about 50 million hectares. In the region, the initiative has received private sector pledges of up to US\$2.5 billion in investments, provided the right projects are identified. A recent report by the Conservation Finance Network provides a Market Development Framework that analyzes the main challenges and policy options for this type of intervention (Whelpton and Ferri, 2017). It argues that institutions and policy are as important as risk management, that the role of public and concessional finance is catalytic, and that the market must be built incrementally. In this context, the role of IFIs such as IDB Invest become even more critical in developing models that may be replicated throughout the region. And it underscores that more studies must be conducted to fully understand the role and potential for the public sector to attract more private investment into the sector.



CHAPTER 5

FISCAL INSTRUMENTS FOR DECARBONIZATION

This section looks at the traditional economist's approach to solving climate change: the pricing of carbon as a negative externality. It also discusses the political feasibility and relevance of carbon pricing instruments under the prism of Latin America and the Caribbean's political, economic, and social realities. While recognizing the potential for those instruments, they should be evaluated in terms of both their actual and intended results. In the end, they are an economically efficient instrument with poorer-than-expected results in terms of carbon effectiveness. The chapter goes on to identify solutions that may reinforce the existing framework and render it operational in the case of Latin America and the Caribbean.

ADDRESSING CARBON AS A NEGATIVE EXTERNALITY

Greenhouse gas (GHG) emissions act as a negative externality that both producers and consumers impose on society. This externality takes the form of more pollution, health problems, environmental damage, and most importantly, climate change. Economists have widely discussed mechanisms to internalize this externality. Carbon pricing is one of the approaches; emitters are charged a fee for every unit of CO₂ that they send to the atmosphere. This charge can be levied in the production process directly or when a final good or service is consumed. When confronted with this cost, emitters are expected to modify their decisions by either shifting toward sustainable alternatives or embracing efficient production and consumption patterns, thereby reducing GHG emissions to socially optimal levels (McKittrick, 2016).³⁴

Carbon pricing can be done in several ways. However, the most common are emission trading schemes (ETS) and carbon taxes.³⁵ The former, also known as cap-and-trade systems, set a cap on the amount or intensity of emissions and involve the trade of allowances auctioned by the government which, in aggregate, account for the cap. In general, firms with high decarbonization costs try to acquire these allowances in the market; in this sense, their price is defined by supply and demand. On the other hand, carbon taxes work the opposite way: they directly fix the price of GHG emissions, usually as a function of the carbon content of a certain fossil fuel, while letting the market determine their amount (Narassimhan et al., 2017). In theory, carbon taxes take the form of Pigouvian taxes. Their size should be such that it drives GHG emissions toward their optimal level. To do so, their rates should be uniform across sectors and products and have a wide base. Besides curbing emissions, carbon taxes generate fiscal revenues that can be reinvested in the economy. This is what is known as the double-dividend hypothesis (Timilsinas, 2018).

Carbon pricing has been recognized as a popular mechanism to promote decarbonization, especially after the 2015 Paris Agreement (World Bank, 2019b; Gillingham and Stock, 2018). Of 185 parties that committed to reduce their GHG emissions by 2030, up to 85 are considering using carbon pricing to achieve their goals. In particular, pricing via carbon taxes has gained much of the attention of policymakers around the world as the most efficient instrument available to reduce energy consumption and promote better fuels (IMF, 2019). However, other policies such as energy efficiency standards have resulted in equally—if not more—important mitigation results. In recent years, carbon tax initiatives have multiplied, at both the national and

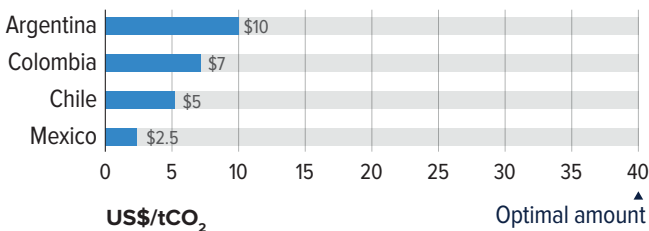
34 Expected modified behaviors include a lower emission intensity of power generation, less electricity demand, and lower demand for fuel for transportation and heating (IMF, 2019).

35 Indirect carbon pricing strategies involve government regulations on GHG emissions such as clean energy standards or gasoline taxes, and feebates, which charge products and activities with above-average emissions and subsidize those with below-average contamination rates.

subnational levels, with a notable push in the Americas. In 2019, there were 57 carbon tax initiatives around the world that applied to approximately 20% of total GHG emissions. In general, the evidence on carbon taxes suggests that they have reduced energy use and carbon emissions, but only moderately. These modest results reflect the many restrictions that countries face to both foster more carbon tax initiatives and strengthen existing ones. In the case of Latin America and the Caribbean, political economy considerations merit discussion: can the price of carbon be raised sufficiently, within the needed timeframe, to meet the objectives of the Paris Agreement? That is highly debatable (see Figure 5.1). Another guiding instrument which may

be useful for countries in the region, is the use of a shadow carbon price. By reflecting the true social cost of carbon to society, a shadow carbon price can help determine both private and public investment decisions. The relevance of said instrument in Latin America and the Caribbean must however be considered against other institutional and political economy considerations which affect public expenditure outcomes.

FIGURE 5.1.
Prices in Implemented Carbon Pricing: An Underwhelming Policy Solution Constrained by Political Economy Considerations



SOURCE: Reproduced with adaptations from Carbon Pricing Dashboard, by The World Bank, n.d., <https://carbonpricingdashboard.worldbank.org/>. CC BY 4.0

EMISSION TRADING SCHEMES AND THE KYOTO PROTOCOL: A REGIONAL APPROACH

The Paris Agreement replaced the Kyoto Protocol in 2020. In many ways, the Kyoto Protocol was built with the idea of using international carbon markets to direct climate finance from advanced to emerging, low-income economies. Under Kyoto, only “Annex I” nations (mostly, advanced economies) had to make emission-reduction commitments. The Protocol assigned emission quotas to this group of nations and allowed for international emissions trading to meet them, most notably through the Clean Development Mechanism (CDM). The CDM was created to provide flexibility to Annex I nations in meeting their emission reduction quotas and to assist “non-Annex I” (mostly emerging, low-income economies) in achieving sustainable development.

In contrast, under the Paris Agreement, all countries, independent of their development status, agreed to strive to reach a climate-resilient, net-zero carbon world through the ambition mechanism, which establishes periodically revised NDCs in alignment with a country's Long-Term Strategy (LTS).³⁶ An LTS thus allows countries to periodically evaluate the adequacy of their NDCs to reach long-term development goals and update them accordingly (IDB and DDPLAC, 2019).

While the Paris Agreement allows for international emission trading (under article 6), specific rules are still under negotiation and will be a key issue at the COP26 in November 2021. Once rules are agreed upon, local implementation challenges will require regulatory reforms at the national level. At the same time, some more advanced economies are already discussing bilateral deals with emerging ones, including within the region, to secure emissions rights. This is relevant as discussions to develop regional emissions trading systems are also under way, for instance within the Pacific Alliance, the trade bloc that aims to advance the free movement of capital,

goods, services, and people between Colombia, Chile, Mexico, and Peru. Thus, these bilateral discussions should be considered carefully as they may result in small, bilateral, piecemeal approaches that can result in regulatory lock-in for specific Latin American and Caribbean countries as they embrace bilateral agreements that may preclude them from larger regional integration efforts. Indeed, not all advanced economies have common regulatory standards, and these bilateral deals may also generate regulatory and economic dependence between the signatories.³⁷

Ultimately, regional emissions trading systems (ETS) will be conditioned on a successful economic integration effort that must include regulatory harmonization. A major risk for these incipient, uncoordinated, bilateral approaches is their influence on article 6 negotiations, which could result in an even slower adoption of ETS-type solutions for climate action.

As countries work on their climate strategy on the one hand and climate negotiations on the other, they should keep in mind several lessons from the last two decades. The first lesson is that while

BOX 7

Lessons Learned from the CDM for Paris Agreement Implementation

For global trading to reach its full potential, lessons learned from the CDM will have to be applied. The CDM showed the importance of a robust monitoring, reporting, and verification system, and the role of Designated Operational Entities (DOEs) to validate projects and emission reductions. Developing countries also face technical and institutional challenges, both in developing national emission registries and linking these to NDCs. Again, this highlights the need for clear, multi-sectoral climate planning to ensure that public expenditures are tied to sustainable development outcomes and emission reductions. A comprehensive policy framework that meets these needs would also allow for the tracking of public and private resources, including international finance flows aimed at delivering a sustainable, clean development paradigm. With their experience and their regional approach, IFIs and MDBs have a particularly critical role to play.

36 The Paris Agreement does recognize common but differentiated responsibilities, as a nod to the divide between more advanced and emerging economies.

37 Regulatory dependence refers to the adoption of norms and regulations that may enable an emerging nation to access the benefits of a bilateral trade agreement while also generating unforeseen negative spillover effects for growth and economic integration with other partners that stem from the conditions of said bilateral agreement.

carbon markets are theoretically promising, 20 years of experience have fallen short of producing a foolproof path to decarbonization through carbon pricing (Green, 2021; Lilliestam et al., 2021). Substantial limitations to the emergence of domestic carbon markets in the region include a generalized lack of trust in institutions and their enforcement capacities, and the consequences of pricing (OECD, 2018). Importantly, at the domestic level, other policies have played a bigger role: for instance, feed-in tariffs and auctions have made renewable energy, which was a utopic promise in the 1990s, into a mass-market technology and the cheapest source of energy globally (IEA, 2020a).

The second lesson is that the understanding of the impact of decarbonization in emerging economies is shifting. Decarbonization used to be seen primarily as a burden imposed on non-Annex I countries by the early industrial powers. Increasingly, it is seen as a development strategy that can be in their interest (Groves et al., 2020; Saget et al., 2020), and even an opportunity to recover more effectively and sustainably from the impacts of the pandemic (IEA, 2020b; IMF Fiscal Affairs Department, 2020).

CARBON TAXES IN LATIN AMERICA

In the specific case of Latin America, carbon taxes have been embraced by some countries, even though GHG emissions in the region are a relatively small fraction of global emissions. The most notable cases are those of Argentina (initially US\$10 per ton of CO₂ but now US\$6.25 accounting for the currency depreciation), Colombia and Chile (both at a rate of US\$5 per ton of CO₂), and Mexico (US\$2.5 per ton of CO₂).

A key peculiarity of Argentina's carbon tax is that it does not aim to increase energy prices or to increase tax revenues in the short run, but to replace ongoing fuel taxes in a context of persistent macroeconomic restrictions. It is applied to all fossil fuels except jet fuel and natural gas, and covers 20% of total GHG emissions (Gutman, 2019).

Mexico was the first Latin American country to set a carbon tax in 2013. Its rate varies depending on the carbon content of fossil fuels relative to GHG emissions of natural gas which, like jet fuel, are exempted, covering 47% of GHG emissions.

Chile enacted its carbon tax in 2018 for the electricity sector, particularly boilers and turbines with thermal inputs above 50 MWT (Narassimhan et al., 2017). This accounts for 39% of total GHG emissions. Its revenues are intended to finance education and renew Chile's electric grid.

Finally, Colombia established a carbon tax in a December 2016 reform that covers most fossil fuels, including natural gas for petrochemical and refinery use, accounting for 40% of total GHG emissions.³⁸ Coal production (mostly exported) is exempt. The law established exemption credits for investment in green projects. In terms of the allocation of revenues, 25% are used to preserve different ecosystems (5% to preserve protected areas) and 75% to finance the implementation of the peace agreement (Sabogal and Puerto, 2019). In Argentina, Colombia, and Mexico, taxes are levied at the production or import point (upstream taxation), which allows for better administration of carbon taxes. In Chile, taxes are paid by the end user.

Carbon taxes in Latin America are full of challenges. For instance, their initial proposals were much more ambitious than their final outcomes, exposing weak political support. Even though they cover an important share of total GHG emissions—similar to that of OECD countries—their low rates and exemptions could shift the use of fossil fuels not toward cleaner sources but exempted ones, such as natural gas. Importantly, Latin American carbon taxes lack compensation mechanisms for specific segments of the population that may be directly or indirectly hurt by them. Finally, there is room for regional cooperation to strengthen carbon taxes and promote market mechanisms, such as ETS (Narassimhan et al., 2017).

One of the major restrictions that carbon taxes face globally is their low rates. Even though carbon taxes ranged between US\$1-US\$127/tCO₂e in 2019, the average price is below US\$2. At these rates, the ability of carbon taxes to curb GHG emissions and keep the rise in global temperature below 2°C by 2030 is limited. In fact, various estimates suggest that carbon taxes should range between US\$40/tCO₂e and US\$100 during the next decade to achieve the targets of the Paris Agreement.³⁹ Currently, fewer than 5% of all carbon tax initiatives fulfill this requirement. Moreover, few existing carbon taxes have explicit guidelines or mechanisms regarding future increases. This diminishes the impact of carbon taxes on emissions and fails to deliver clear market signals to private agents about long-term climate policy (Narassimhan et al., 2017).

However, low rates might be the by-product of an additional restriction: public opposition to carbon taxes, which could be grounded in distributional and economic concerns (Timilsinas, 2018).⁴⁰ Moreover, even with awareness of the need for carbon pricing, its implementation is constrained by political economy considerations, which explains why carbon taxes are below what they should be to curb emissions. Thus, the outcome of the political process often leads to low carbon taxes, which are seen as a compromise between the environmental and competitiveness agendas. Even if carbon taxes are relatively high, policymakers tend to limit their effective coverage

38 Carbon tax coverage of total GHG emissions for Latin American countries is taken from IMF (2019).

39 These estimates could vary between countries according to their Paris Agreement pledges and the responsiveness of local emissions to carbon pricing (IMF, 2019).

40 Other concerns involve the state of the economy, political stability, and public debt (Jakob et al., 2019).

by exempting certain sectors and activities to make carbon taxes politically palatable (Timilsinas, 2018; Narassimhan, et al., 2017). A case in point is Mexico, where carbon taxes are levied only in proportion to carbon emissions from fossil fuels in excess of those of natural gas.

To face these obstacles, ensuring public support for carbon taxes, or the removal of fossil fuel subsidies is crucial. However, a wide-ranging communication strategy in which the costs (which are visible and appear in the short term) and the benefits (which are diffuse and seen years later) of carbon pricing are clear is insufficient. Policies that compensate affected carbon-intensive economic sectors are necessary. Proceeds from fossil subsidies can be partially channeled through targeted conditional cash transfers to support the most affected households. In this sense, policymakers should embrace a gradual approach in which a strategy to reduce the social costs of carbon pricing must be clear from the outset to prepare the ground and reduce political resistance (Jakob et al., 2019).

EFFECTS OF CARBON TAXES: ARE THEY WORTH THE TROUBLE?

Measuring the effects of carbon taxes on GHG emissions is a challenging task. For starters, the effects of simultaneous climate-related policies must be separated from those of carbon taxes. Also, a counterfactual scenario in which no carbon tax is applied needs to be built. In general, the evidence on carbon taxes combines numerical simulations and quasi-experimental settings to address their effects on emissions (Timilsinas, 2018; Murray and Rivers, 2015).

One of the most studied cases is the carbon tax adopted in 2008 in British Columbia (Canada). The tax started at CAN\$10 per ton of CO₂, was increased to CAN\$30 in 2012, and to CAN\$35 in 2018. It covers almost 70% of emissions and provides exemptions on fuel exports, air travel, and agricultural production emissions, among others. Note that this tax is revenue-neutral in the sense that it is reallocated into the economy through lower taxation on businesses and individuals and cash transfers to poor households. This feature built up support of the carbon tax by consumers and business leaders, which was a critical condition for its final approval. Support has increased over time; however, various sectors have exerted pressure for additional exemptions which, in some cases, have been incorporated into the tax regime (Murray and Rivers, 2015).

Examples of successful carbon tax implementation schemes are scarce. The British Columbia carbon tax has, however, been the subject of several studies that analyze its effects on GHG emissions and overall economic performance. Murray and Rivers (2015) suggest that it is an effective instrument to curb GHG per capita emissions by 5%-15% (3.5 times above the reduction in the rest of the country, where no carbon tax was established at the time) and it had small or negligible effects on economic performance. Several studies have analyzed the sectoral heterogeneity of these results, emphasizing the reduction of gasoline, diesel, petroleum and natural gas-related emissions (Beck et al., 2015; Elgie and McClay, 2013; Bernard and Kichian, 2019). However, recent evidence suggests that the overall reduction of GHG emissions resulting from the tax is not significant, despite significant effects in some sectors such as transportation, manufacturing, and construction (Pretis, 2019). Overall, the evidence on the British Columbia carbon tax indicates that GHG emissions fell but not to the extent that a less exempted tax would have allowed. Finally, even though estimated aggregate welfare losses have been small, mostly due to the recycling of tax revenues into the economy, there is no evidence of enhanced economic growth (Beck et al., 2015).

Although other carbon tax experiences around the world have been analyzed, their effects on curbing GHG emissions have not been assessed systematically. An interesting case is Australia, where a carbon tax on most fuels was levied in 2012 but rapidly removed in 2014 when a new government assumed office. During this short period, electricity use and carbon emissions are estimated to have fallen but rebounded shortly after the tax was rescinded (O’Gorman and Jotzo, 2014). Northern European countries have a long-lasting history of carbon taxes. Norway and Sweden, for example, have taken ambitious steps toward taxing carbon and have some of the highest rates: carbon taxes in Sweden reach US\$127/tCO₂e. Even though the taxes have reduced the intensity of carbon emissions, they have not kept emissions from rising over time, partially due to inelastic demand for oil and natural gas and exemptions on exports of these products (Narassimhan, et. al, 2017; Lin and Li, 2011). The evidence suggests that these stringent cases have been successful at curbing GHG emissions but have been undermined by their exemptions. Finally, it has been argued that upstream schemes, in which carbon taxes are applied at the points of fuel extraction or directly on emitters, can enhance enforcement, especially in low-income countries.

COMPENSATION COUNTS: DEALING WITH THE OBSTACLES TO CARBON TAXATION

Even though carbon taxes are not expected to improve economic performance, they could be designed in a way that avoids or balances welfare losses. In general, welfare losses are lower when a carbon tax is accompanied by compensatory policies (Beck et al., 2015; Timilsinas, 2018). More importantly, certain economic and distributional impacts of carbon taxes may undermine their support. This is why several analysts argue in favor of the double dividend hypothesis, in which, besides curbing GHG emissions, carbon taxes can be used to recycle revenues into the economy to alleviate the tensions they create. Moreover, compensation could be a counterweight for exemption demands. Taxes must be efficient, but first they must be acceptable (World Bank, 2019b; IMF, 2019).

Several options are available to compensate for the costs of carbon taxes. Offsets can be linked to distributional concerns. For instance, the incidence of a carbon tax can be skewed toward low-income households, both through higher energy prices, higher cost of public transportation, or worker and community displacement (Murray and Rivers, 2015; IMF, 2019). Thus, governments can (i) offer (lump sum) cash transfers to poor households affected by higher energy prices, such as has been done in Pakistan; (ii) cut general taxes that are already creating distortions in the economy, such as value-added, income, or labor taxes; (iii) increase expenditure on infrastructure and other public goods; and (iv) subsidize green technologies (Timilsinas, 2018; Renner, 2018).

Regarding economic efficiency, the burden for firms and sectors can be alleviated in various ways. Energy-intensive and trade-exposed sectors can be compensated with border tax adjustments, which are tariffs on imports from countries that do not embrace policies to combat climate change. Other options involve payroll and corporate tax cuts, or corporate income tax credits (Timilsinas, 2018). Finally, governments can also use carbon tax revenues to invest in clean energy and promote research. Japan and India have taken this route (Narassimhan, et al., 2017). In any case, compensation policies should be framed within a comprehensive plan that exploits environmental synergies with related sectors while being consistent with ongoing policies that aim to enhance competitiveness and improve social indicators (Jakob et al., 2019).

To a certain extent, lump sum transfers and tax cuts offer opposite approaches. For instance, transfers can benefit poor households but limit economic efficiency gains while the tax cuts foster efficiency but are potentially regressive. In some cases, governments may prefer to combine the approaches to minimize the conflict, as in British Columbia

or Sweden (Murray and Rivers, 2015; IMF, 2019). Another tradeoff arises between research and investment in clean energy, which could double the environmental impact of carbon taxes by reducing both present and future GHG emissions but can together raise distributional and efficiency concerns, which are not immediately solved by green investments. In any case, these discussions should consider the indirect benefits of tackling climate change, such as fewer deaths related to air pollution (IMF, 2019).⁴¹ This discussion highlights a knowledge gap that must be addressed by researchers and policymakers in the following years, taking into account each country's context with respect to these tradeoffs (Timilsinas, 2018).

Introducing carbon taxes is particularly hard in countries with initially high fossil fuel subsidies, as is the case throughout Latin America. Governments aiming to promote carbon taxes, an explicit price on carbon, while removing fossil fuel subsidies and thus putting an implicit price on carbon, should double their compensation efforts.

Fossil fuel subsidies are widely used around the world. In 2015, they accounted for 6.5% of global GDP. They are used to make the fossil fuel industry competitive and fossil energy affordable (Carlino and Carlino, 2015); however, since they work as a negative price on carbon and thus widely incentivize its use, they undermine and distort carbon pricing efforts and impose several environmental costs on society —precisely the problem that carbon pricing tries to address (World Bank, 2019b; Rentschler, 2018).⁴² In fact, if global fossil fuel subsidies had been removed in 2013, GHG emissions would have declined by 21%, fossil fuel-related pollution deaths would have been 55% lower, and, interestingly, welfare would have increased 2.2% of global GDP (Coady et al., 2016). Even though some effort has been made to reduce these subsidies, most of them are driven by falling oil prices and not climate change efforts (World Bank, 2019b).

During the past two decades, high oil prices motivated Latin American countries to subsidize fossil fuels. Countries with high oil dependence and weak institutions were particularly susceptible to such policies. However, these subsidies have recently been questioned as macroeconomic, fiscal, and environmental concerns take precedence (Di Bella et al., 2015). Between 2011-13, these subsidies accounted for 1% of GDP in the region. If negative externalities and forgone tax revenues are considered, they represent up to 3.8% of regional GDP, which is comparable to what countries spend on health and education. In fact, energy subsidies in Latin America are very expensive: to transfer US\$1 to a poor household the state must spend US\$12 (Feng et al., 2018). In general, countries with large fossil fuel subsidies — Argentina, Bolivia, Brazil, Ecuador, and Venezuela— tend to permanently

41 For instance, the IMF estimates that a US\$50/tCO₂e global carbon tax in high-income countries would prevent 600,000 premature air pollution deaths by 2030.

42 These benefits are questioned by authors such as Whitley and van der Burg (2015), who argue that fossil fuel subsidies could become a burden for government budgets and encourage inefficient use of resources in several industries, which can reduce competitiveness.

fix nominal energy prices below world prices. These subsidies usually follow discretionary guidelines and are regressive. On the other hand, countries where these subsidies are smaller use automatic rules and price stabilizers to adjust to shocks while targeting low-income households. Such is the case of Chile, Colombia, and Peru. However, formulas need to be updated frequently to keep the price adjustment mechanisms from running out of funds. In cases such as Mexico, price-regulation mechanisms are set to expand subsidies when energy prices rise, thereby diminishing the effectiveness of ongoing carbon pricing initiatives (Di Bella et al., 2015). Unfortunately, the region faces several constraints to pursue fossil fuel subsidy reforms, but successfully implementing these reforms could not only generate better welfare but also help reduce the region's carbon footprint by up to 5% (Jakob et al., 2019). If part of the resources liberated by these reforms is also used to implement green compensatory measures such as better mass transportation systems, considerably more emissions can be cut.

Measuring the progress of a country in terms of carbon pricing should account for the extent to which fossil fuel subsidies persist. As with carbon taxes, governments may be reluctant to remove these subsidies due to public opposition (Whitley and van der Burg, 2015; Carlino and Carlino, 2015). Lack of information on the impact on the poor, pressure groups, weak institutions that lead to mistrust, and simple inertia of subsidies can also hinder reform (Clements et al., 2013). Moreover, governments can use fossil fuel subsidies to gain the political support of low-income households and industrial interests (Feng et al., 2018). To successfully promote a fossil fuel subsidy reform, governments must provide clear information and widely discuss the “scale of subsidies, their costs and impacts, who pays and who benefits, plans for reform, and complementary measures to be adopted” (Whitley and van der Burg, 2015, p. 3). Also, stakeholders must be represented and consulted in the decision-making process before and after the reform (Jakob et al., 2019). Governments should highlight that energy subsidies are a very expensive mechanism to support poor households, even if these are well targeted, which seldom is the case (Feng et al., 2018). The fiscal space available and how much of it would be used to compensate households and firms should also be clear. In contrast to carbon taxes, removing fuel subsidies could free up enough resources to accommodate both compensation and transfers to the general budget (Shaffitzel et al., 2019). In fact, authors such as Feng et al. (2018) estimate that less than a quarter of fiscal revenues due to fossil fuel reform are needed to compensate low-income households in Latin America.

Governments can pursue several compensatory measures to remove fossil fuel subsidies. Since they can be better targeted than a general fuel subsidy, their potential impact on welfare is much clearer (Coady et al., 2016). In the case of firms, they can provide technical assistance for business restructuring. For displaced workers, they can promote unemployment insurance, retraining, and relocation. Households could benefit from direct

cash transfers or vouchers to access education, health, affordable energy, and transport services (Jakob et al., 2019). Broader measures include tax cuts and expenditures on public goods. In general, expanding the social safety net has proven successful to make fossil fuel subsidy reform feasible. If available, this expansion should be made on top of prevailing social programs (Clements et al., 2013; Rentschler, 2018; Shaffitzel et al., 2019). In fact, both developed and developing countries have embraced these compensation measures. Such is the case in Armenia, Brazil, Dominican Republic, Ghana, India, Indonesia, Iran, and Jordan, which combined direct cash transfers with educational, health, electricity, food, and public transport subsidies to replace their fossil fuel subsidies (Whitley and van der Burg, 2015).

Carbon pricing initiatives, despite being the most efficient, are not the only tools available to curb GHG emissions and mitigate climate change. Market failures regarding climate change involve other dimensions such as knowledge spillovers and socially inefficient investment in other sources of energy. As important as it is to penalize negative externalities associated with fossil fuel consumption, governments should also reward positive externalities associated with clean energy infrastructure. This can be done by boosting investments and removing barriers, which face fewer political restrictions and stakeholder pressures than carbon taxes or other measures to curb emissions (Mecking et al., 2016; Pahle et al., 2017; Paltsev et al., 2018). More broadly, technology-specific policies that provide incentives to replace fossil-fuel energy sources can complement carbon pricing. These topics will be discussed in the following chapters.



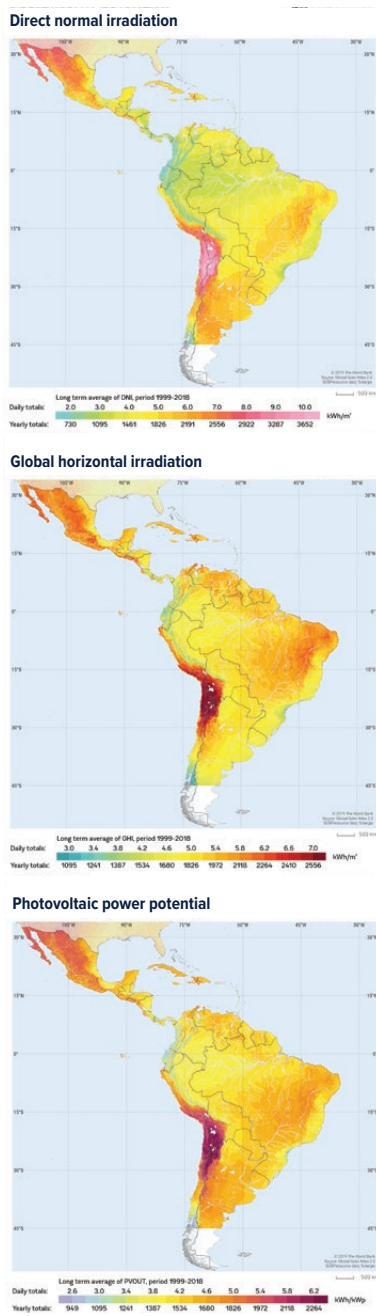
CHAPTER 6

RENEWABLE ENERGY: A CHANCE FOR THE REGION TO SHINE

Both nonconventional and conventional renewable energy technologies offer a policy solution which, if well designed, can allow Latin America and the Caribbean to stand out on the global scene. While the region is endowed with considerable potential for the exploitation of renewable energies, governments have an important role to play in the adoption of these technologies.

PLENTY OF POTENTIAL IN RENEWABLE ENERGY

FIGURE 6.1.
Solar Radiation and Potential



By directly replacing fossil fuels to provide energy, renewables offer ample potential to reduce GHG emissions. According to Irena (2020a), a massive transition toward clean energy would cost, by 2050, US\$19 trillion; however, the gains from lower environmental and health negative externalities would be between US\$50 and US\$142 trillion. Moreover, unlike carbon taxes, the deployment of renewable energy is not neutral to the economy; it offers potential gains related to innovation, job creation, and synergies that strengthen supply chains. In other words, renewables enhance competitiveness (for a recent evaluation, see Metcalf and Stock, 2020; Irena, 2020a; Paltsev et al., 2018). And these gains benefit not only large industries but local communities by giving them access to economic opportunities and sustainable energy sources. Finally, renewables provide energy security by giving flexibility to the system and resilience against weather shocks (Paltsev et al., 2018; Ferroukhi et al., 2016).

Renewables are particularly relevant in the context of growing energy demand. In Latin America, primary energy and electricity demand is estimated to increase between 25% and 40% by 2040 (Paltsev et al., 2018; Balza et al., 2016). To meet this demand will require investments comparable to building 18 of Latin America's largest hydropower stations. Energy demand is driven by income, population growth, urbanization, and broadened electricity access. In addition, as discussed in Chapter 3, the region must continue to diversify its energy matrix (Ferroukhi et al., 2016). To achieve both goals require reducing energy intensity—measured as total energy use relative to GDP—in the coming decades, while embracing renewable energy.

Latin America is well suited, relative to other regions, to develop and adopt renewable energy. It enjoys the largest and most diverse supply of renewable energy resources in the world (Griffith-Jones et al., 2017; Flavin

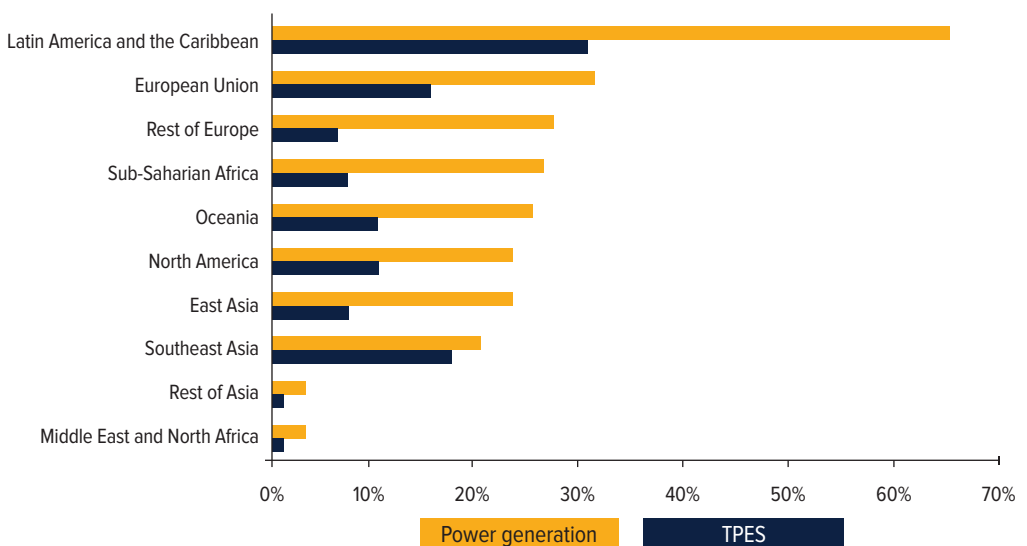


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et al., 2014; Meisen and Krumpel, 2009). Given the region’s renewable endowments, it could produce 30 times its future electricity needs (Flavin et al., 2014). Latin America is particularly suited for solar, wind, and biomass energy deployments in the majority of countries due to permanent access to sunlight during the year and favorable weather conditions (Ferroukhi et al., 2016). Such is the case of northern deserts of Chile, which could become a global power in solar energy, as well as large areas of Mexico and Brazil (see Figure 6.1). In fact, Brazil’s exposure to solar radiation is 40% higher than Germany’s (FGV, 2016). The potential of wind is particularly great in Central America, northern Colombia, the northern coastal zones of Brazil, and Patagonia in Argentina, among others. Further opportunities arise from potential offshore wind sites, which remain unexploited.

Large renewable energy suitability explains why the region exhibits the cleanest energy matrix in the world. Figure 6.2 shows renewable energy shares around the world, both as a percentage of total primary energy supply (TPES) and electric power generation. Latin America and the Caribbean leads both indicators, with renewable shares of 30% and 65%, respectively, compared to corresponding global averages of 11% and 26% in 2017 (Irena, 2020a). This translates into lower total energy demand from fossil fuel sources: 70% compared to the world average of 82%. Electricity demand is even lower at 60%, while the world average is 73%. Because of the region’s energy demand preferences, renewables in the region have been growing steadily in recent decades: between 2006 and 2015, renewable installed

FIGURE 6.2. Renewable Energy Share (%) in 2017, Power Generation and Total Primary Energy Supply (TPES)



SOURCE: Reprinted from *Global Renewables Outlook: Energy Transformation 2050*, by IRENA, 2020. Copyright © IRENA 2020

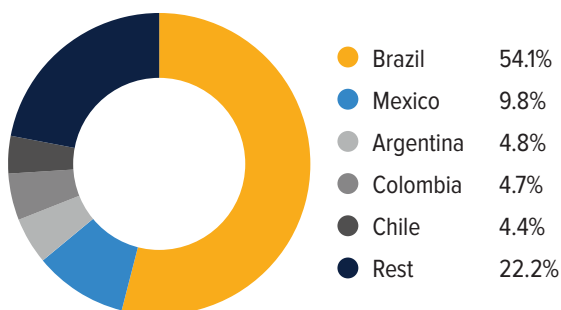
capacity grew more than threefold (FGV, 2016), although this growth has concentrated in a small group of countries. Even though these numbers suggest an important advantage for renewable adoption in the region, various obstacles limit widespread and sustainable developments in this regard.

Figure 6.3 shows Latin America and the Caribbean’s electricity installed capacity matrix in 2019. Hydropower accounts for almost half of electricity installed capacity (less so in terms of power), or 185 GW, outweighing the share of traditional fossil fuels and other nonrenewables, which account for more than a third of the matrix. Nonconventional renewables represent only 14% of the electricity matrix (13 GW). In this case, bioenergy and onshore wind hold the largest share. Technologies with large potential, such as solar,

have still not been widely adopted. In this sense, even though hydropower’s share in the energy matrix has been declining in recent decades, it remains the dominant driver of renewable technology in the region, while fast-growing nonconventional renewables still represent a small share.

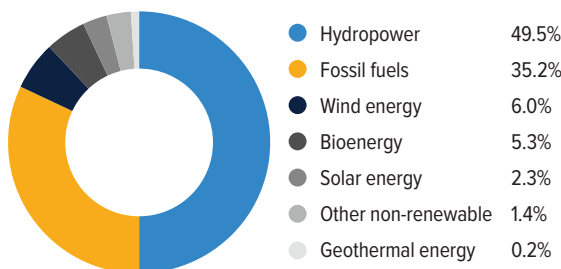
Renewable energy supply in Latin America and the Caribbean is concentrated in particular areas and energy sources, limiting its full deployment. Even though most of the region enjoys great potential for renewables, Figure 6.4 shows that around 80% of its total installed capacity comes from five countries (Argentina, Brazil, Chile, Colombia, and Mexico); more than half of the region’s capacity is concentrated in Brazil, the leader in renewable investments in the past decade. Although the region has recently embraced nonconventional renewables, hydropower still accounts for most of its energy matrix. This concentration reflects historical investments in this technology, which have helped the region become one of the lowest GHG emitters in the world but has exposed several vulnerabilities in energy security and the protection of local communities (see Chapter 2). While further investment in new large hydropower projects is limited, there are substantial needs for investments in the renovation of many of these older projects.

FIGURE 6.3.
Renewable Energy Installed Capacity, 2019,
Selected Countries



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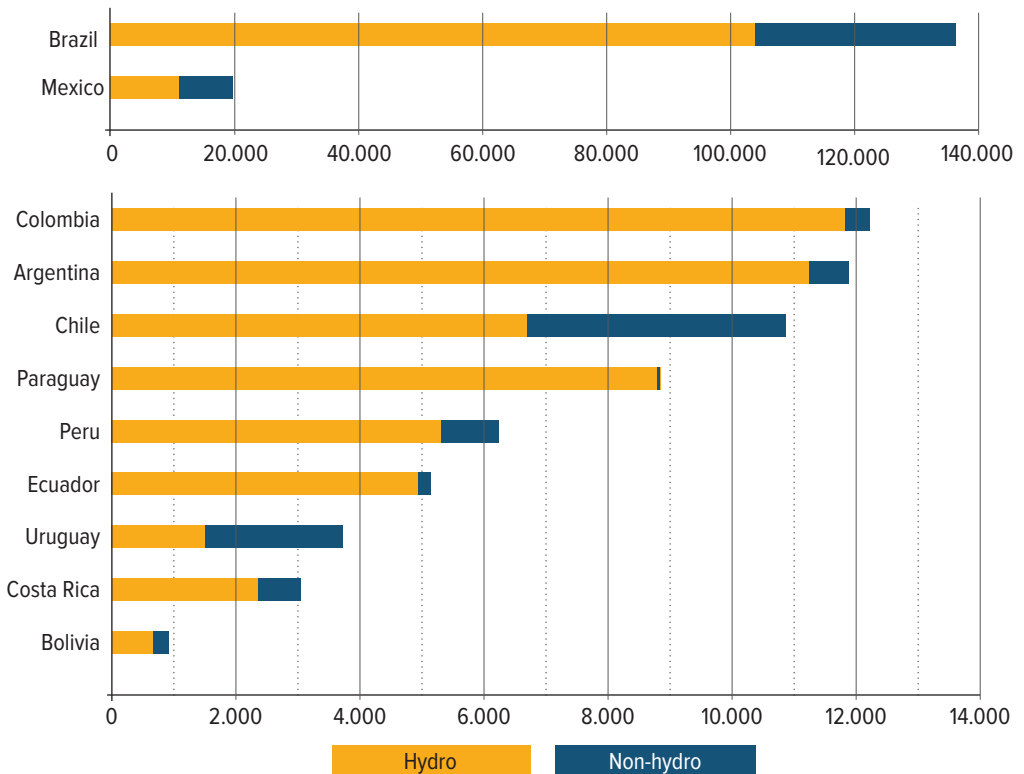
FIGURE 6.4.
Electricity Installed Capacity in Latin America by
Energy Source, 2019



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In Latin America, 15 million people lack access to electricity and more than 50 million depend on traditional biofuels in remote places (Ferroukhi et al., 2016). Renewable technologies could bring rural electrification to these zones and stimulate local economies through off-grid investments (Irena, 2020a). These elements make the case for nonconventional renewable energy sources that complement conventional renewables, phase out fossil fuels, and increase the resilience and flexibility of the energy system. Additionally, unconventional renewables lessen opposition to large hydropower projects from local communities. However, as Figure 6.5 shows, unconventional renewable energy is still well below that of hydropower, except in Chile, Costa Rica, Mexico, and Uruguay. On the other hand, countries in the region should be wary of technological dumping, the process through which cheaper, older, more polluting material is transferred from more advanced economies to the LAC region, which may result in negating national efforts for Paris Agreement compliance. This is particularly relevant as more advanced economies use the threat of barriers for the importation of non-Paris-aligned agricultural and manufactured goods from emerging economies.

FIGURE 6.5.
Renewable Energy Installed Capacity by Technology, 2019 in Selected Countries



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COSTS AND COMPLEMENTARITIES

A salient characteristic of unconventional renewable energy is its complementarity with other energy sources, which promotes energy diversification and security. These technologies are inherently intermittent and thus available at certain times of the day or seasons of the year. In this sense, when well-equipped and coordinated, they can balance the availability and storage of energy (Morshed and Zewuster, 2018). In Latin America, where hydropower can cover almost 100% of the electricity mix, as in Paraguay, unconventional renewables can compensate for supply shortages during dry periods. Hydropower can support renewables by storing excess energy production or compensating unexpected interruptions in production (Ferroukhi et al., 2016). Moreover, the interconnection between unconventional sources of renewable energy, such as wind and solar, is crucial to balance and diversify the energy matrix.

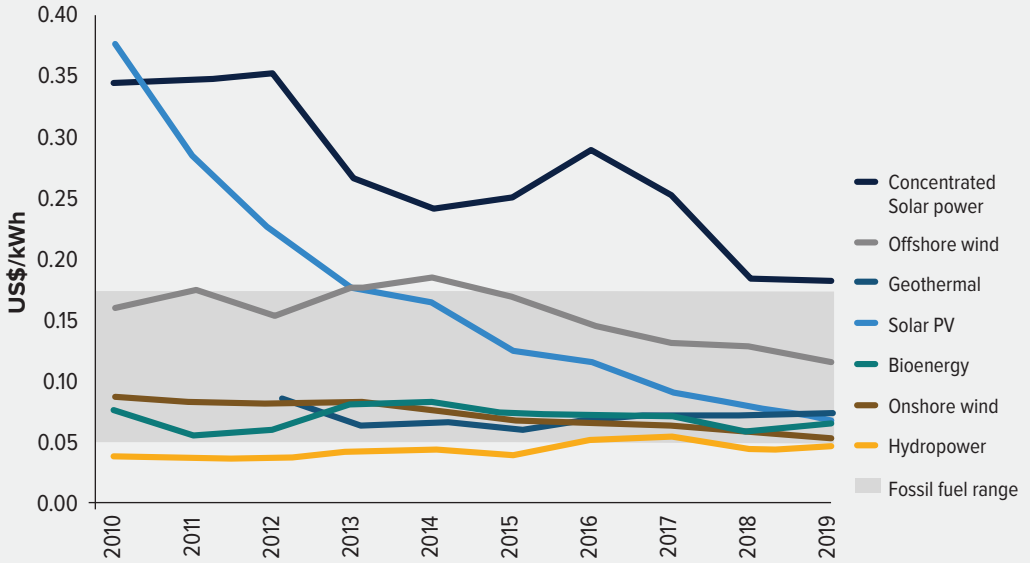
However, for intermittence to become an advantage and not an obstacle, several investments must complement and enhance the framework in which renewables operate. For instance, renewable adoption could be hindered if suppliers are not linked to and within the energy grid. In this sense, grid capacity updates, connectivity, digitalization, affordable battery energy storage—to work at night in the case of solar—and transmission lines need to be expanded to reduce the technological risks of embracing renewables (Paltsev et al., 2018; Flavin et al. 2014). Only with these additional investments can unconventional renewables be scaled up.

The pace of unconventional renewable adoption will ultimately depend on its cost. In recent decades, governments have tried hard to drive down costs and make unconventional sources of energy competitive vis-à-vis fossil fuels. Since 1980, price subsidies and regulations have been promoted to incentivize and scale up renewable energy use. This strategy, seemingly inefficient since renewables account for a tiny share of the energy matrix around the world, was designed to promote experience and learning (Naam, 2019). Once prices were sufficiently low, less reliant on subsidies, and competitive relative to fossil fuels, renewable investments surged. This has been the case since 2015 when, for the first time, wind and solar were cheaper than traditional fossil fuel sources of electricity. Renewable prices, especially in the case of solar, have come down well below what specialized agencies forecasted nearly a decade ago.

Due to its lower cost, renewable energy use is expected to grow dramatically in the coming years. Figure 6.6 presents the evolution of the weighted average of the levelized cost of electricity (LCOE) between 2010 and 2019.⁴³ Most renewable prices have converged below US\$0.1 per kWh and close

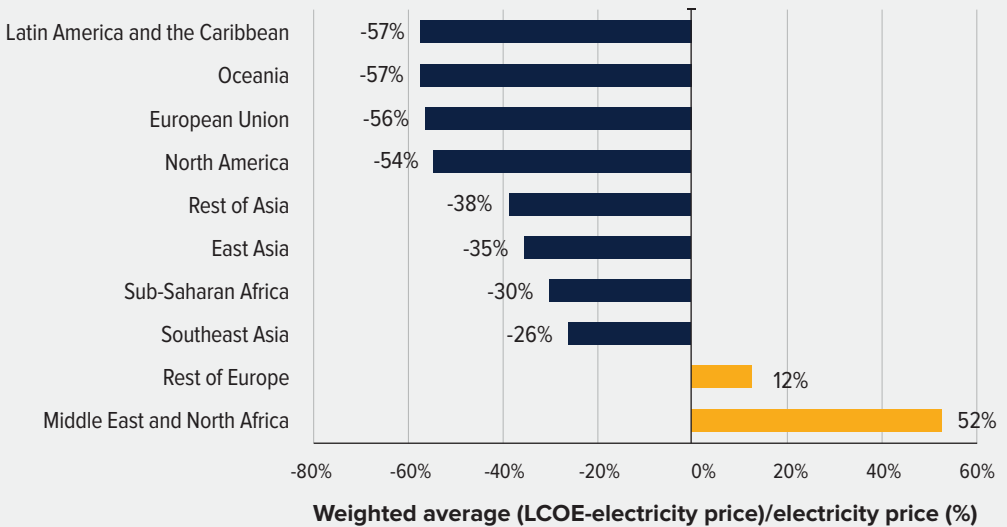
43 LCOE aggregates several elements that determine the total cost of technology deployment, such as the quality of resources and equipment, operation and maintenance costs (Griffith-Jones et al., 2017).

FIGURE 6.6.
The Evolution of Renewable Prices, 2010-2019, LCOE (levelized cost of energy) US\$/kWh



SOURCE: Irena (2020a)

FIGURE 6.7.
Renewable Electricity Costs Relative to Electricity Prices by Region, 2018



LCOE: Levelized Cost of Electricity

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to the lower boundary of the range of fossil fuel prices (US\$0.05-0.17 per kWh). The case of solar photovoltaic (PV) is noteworthy since it began the decade at levels near US\$0.40 and was able to follow the pattern of other renewables. The exception has been offshore wind, for which prices have dropped but less than for other renewables. Finally, prices of hydropower, given its mature technology, have remained around US\$0.40 per kWh with no prospects of falling in the future. In contrast, prices of other renewables are likely to decline.

The region has much to gain from lower renewable costs. During the last decade, costs declined more in Latin America and the Caribbean than in other regions. For instance, the levelized costs of electricity based on solar have been cut by half since 2012 (Ferroukhi et al., 2016). The price of onshore wind has similarly dropped more than 50%, especially in South American countries (Irena, 2020a). Moreover, the region presents the most competitive renewable electricity costs relative to current electricity prices. Figure 6.7 shows that Latin America and the Caribbean leads the ranking with average renewable LCOE 57% lower than current electricity prices. This competitiveness will allow for scaling up renewable investments, increasing the system's resilience against climate change vulnerabilities, improving air quality, and closing the gaps in access to electricity, especially in remote areas.

THE ROLE OF GOVERNMENT

Apart from cost compression, widespread state capacity is needed to guarantee a favorable environment for renewables. Increasing competitiveness of renewables has fostered technological advancements, such as bigger and more powerful turbines or wide production of solar panels. Manufacturers have acquired skills and experience, while economies of scale have lowered costs—for battery storage, for example—driving prices further down. These trends have made renewables, especially solar PV and wind, a dominating technology in the market for new power generation capacity, phasing out investments in novel fossil fuel plants (UNEP and BNEF, 2020). Further cost reductions are expected to make renewables competitive not only against new fossil fuel investments but also against operating (and amortized) ones (Naam, 2019). However, for this to happen, regulatory and institutional frameworks need to phase out fossil fuels, reduce the risks of deploying renewables, and unlock private financing. Fostering more competition through innovative auctions is also important (Paltsev et al., 2018).

In recent years, reverse energy auctions have become a market instrument aimed at reducing renewable prices and mobilizing investments to increase installed capacity. Auctions also provide an alternative for governments to finance green transitions without embracing expensive subsidies like those used in the past. Between 2017 and 2018, 111 GW were auctioned worldwide, the majority in solar PV and onshore wind projects (Irena, 2019a).

Energy auctions may be technology-neutral, resulting in the allocation of renewable or non-renewable energy, or technology-specific, favoring a particular type of energy. Governments or distribution firms willing to buy energy supply, either in energy capacity blocks (GWh) or power generation (MW), set up the tenders. Bidders compete in terms of prices but also on other criteria, such as the technology to be promoted, making the auctions context-specific (Irena, 2015).⁴⁴

Brazil, Jamaica, Peru, and Uruguay have been pioneers in auction developments in Latin America since the mid-2000s. Brazil has been the regional leader with 29 two-step auctions between 2007 and 2019, an effort that has led to one of the largest expansions of wind generation capacity. Industrial policies that award greater participation in energy projects to domestic bidders complement these auctions. Another early adopter, Uruguay, combined auctions, robust institutions, and investment programs to increase its renewable investment per-capita in wind from almost zero in 2007 to the world's top-ranking investor in wind by 2015. Uruguay's auctions exhibited

44 This allows auctions to discover prices that respond to specific country characteristics and not only global trends. Prices that result from auction reveal several elements: the availability of resources, capital and installation costs, local institutional and regulatory environment, investor confidence and experience, government targets, policies and incentives, and auction design (Irena, 2019a). Contracts are usually awarded for long periods (30 years) and indexed to inflation, thereby increasing investors' confidence (Paltsev et al., 2019).

particular traits, such as no pre-qualification (except for observed experience), project capacity limits, and local content requirements to promote the domestic industry. Consequently, wind and solar output increased twenty-fold while curbing previously dominant hydropower, allowing renewables to deliver 85% of its electricity generation and 57% of its energy supply. With no additional power demand, the country has not had more auctions since 2015 (Paltsey et al., 2018; Viscidi and Yepez, 2019).

In Chile, the National Energy Strategy has pushed renewables to reduce the country's dependence on generation from (and imports of) fossil-fuels. Auctions are technology-neutral but are designed to provide intra-day and quarterly blocks of energy, in which renewables are highly competitive (Viscidi and Yepez, 2019). Although nonrenewable projects have also been awarded, Chile is the only country with a legal mandate to reach a 20% share of unconventional renewable sources by 2025 (Griffith-Jones et al., 2017). Chile's auctions have attracted investors in recent years due to adequate design, low risks, and abundant solar resources. Its latest auction held in 2017 awarded the equivalent of annual energy demand at record-low prices (Irena, 2019a).

In Colombia, the first targeted renewable auction in 2019 failed due to unmet competition requirements and was rapidly enhanced with attractive contract lengths, revenue guarantees, quota conditions, and time slots of operation to secure a second successful auction later that year (Viscidi and Yepez, 2019).

Mexico was able to unleash renewables once its energy sector was liberalized in 2013. Since then, three auctions have been held with a combination of renewable targets with neutral ones that have been complemented with a novel cap-and-trade scheme for carbon pricing, thereby combining the allocation of energy and power with that of Clean Energy Certificates. Mexican auctions require awarded contractors to deposit performance guarantees that are returned as the project is completed, which are complemented with noncompliance fines. Incentives are aligned by a reliability guarantee provided by both buyers and bidders. However, Mexico's momentum with energy auctions has been halted by local community disapproval, the cancellation of the fourth auction, and uncertainty over energy liberalization due to the current administration's stances. Ramos et al. (2020) highlight that recent changes by Mexico's Energy Regulatory Commission, as well as by the National Center for Energy Control may also undermine these early success stories.

Argentina has recently expanded renewable energy through its RenovAr auctions program, which is framed within the national objective of 20% renewables in the energy matrix by 2025. At the same time, the energy sector has been liberalized and electricity subsidies have been removed. Its bidding process adjusts prices by transmission losses and early completion dates. To outweigh macroeconomic risks, payments are guaranteed

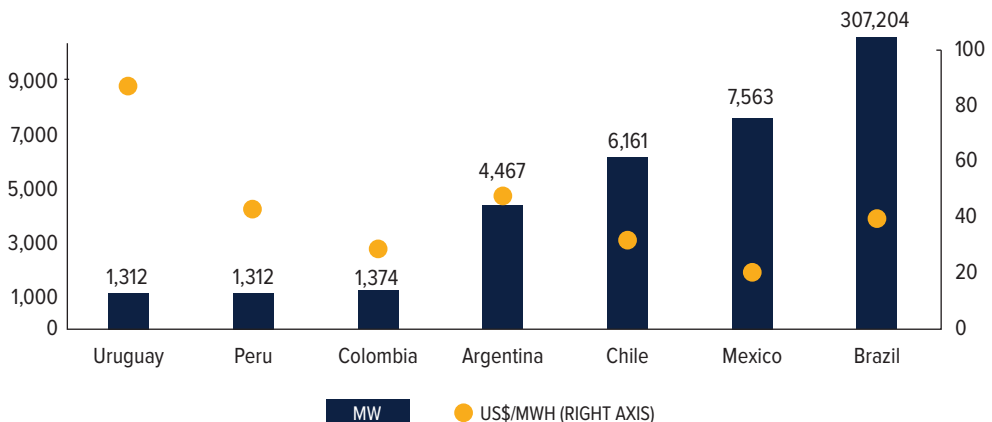
by a fund managed by the World Bank. In contrast to other auction designs, Argentina has strict qualification requirements and local content tax incentives, which are rewarded in the selection process. Notably, in 2017, Argentine auctions attracted more investment than in the previous years combined (Paltsev et al., 2018). This success reflects well on the RenovAr program despite a difficult macroeconomic environment.

The diversification of auction mechanisms in Latin America has driven renewable costs to record-low levels and increased installed capacity in recent years. By 2012, Brazil accounted for almost 80% of renewable investment in the region. Since then, 12 countries have been involved in energy auctions, converting the region into a global leader in the market for renewable energy (OLADE, 2020). The majority of auctions have been awarded to wind and solar projects, even in the context of neutral technology auctions, and multiple bidders have participated in auctions.

Figure 6.8 presents additional installed capacity in MW fostered by auctions in the most engaged Latin American countries since their auction programs started. It also displays the last average renewable cost resulting from auctions. As mentioned, Brazil has installed more than 300,000 MW of renewable energy since 2006, achieving average prices of US\$39.3 per MWh. In Mexico, three particularly effective auctions promoted the region's second largest provision of renewable capacity since 2015, with record-low average prices of US\$20.6 per MWh driven by solar and wind. Chile and Argentina have had similar success, although the latter has not yet widely reduced its average prices. Meanwhile, Colombia was able to award 1,374 MW in 2019, a significant amount for a newcomer in the field. Finally, Uruguay, as an early pioneer, awarded the necessary amount of renewable supply, 1,312 MW, at competitive pre-2015 prices.

FIGURE 6.8.

Additional Renewable Installed Capacity and Last Average Price from Auctions in Latin America, 2019



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CHAPTER 7

DRIVING DOWN EMISSIONS IN URBAN TRANSPORT

In the region, a critical area for intervention is the urban transportation sector. The design of climate-aligned urban transportation policies not only allows for cost-effective mitigation actions but can also contribute significantly to poverty reduction and economic growth. The region leads the world in the adoption of Bus Rapid Transit (BRT) systems which cost less than other mass transit systems, but which must be coupled with other solutions. Finally, the electrification of these systems, as well as the adoption of electric vehicles (EVs) is worth supporting for a number of reasons. To begin with, it allows the region to offer a cleaner energy matrix than other regions. Moreover, the region's natural endowments in lithium and other materials make it a perfect place to participate in electric vehicle value chains, thereby contributing to economic development.

TRANSPORTATION: A KEY SECTOR FOR INTERVENTION

While energy consumption can also be modified at the national and municipal levels through regulation and pricing schemes, the second most important action area is the decarbonization of the transportation sector. Indeed, the transport sector in Latin America and the Caribbean accounts for 35% of total greenhouse gas (GHG) emissions from burning fossil fuels. More importantly, effective mass transportation policies could help reduce the region's emissions while also narrowing social and economic inequalities. In fact, advancing on the integration of public transport systems and their improvement could boost economic growth significantly, while reducing emissions (Vassallo and Bueno, 2019).

The emergence of the middle class and recent economic growth have increased the region's motorization rates (De la Torre et al., 2009). Between 1990 and 2010, car ownership rose from 75 per 1,000 inhabitants to 175 per 1,000 inhabitants in Mexico and nearly tripled in Brazil from 45 to 125 per 1,000 inhabitants (Fay et al., 2015). In many cities, motorcycles make up as much as 49% of the vehicle fleet and ownership has surpassed that of automobiles (Yañez-Pagans et al., 2018).

By 2013 and throughout the entire region, most cities that follow and apply the World Health Organization's (WHO) air quality guidelines (AQG) exceeded recommended values in its three most important dimensions. In other words, a lack of policy responses to sustain the economic growth the region experienced resulted in higher congestion rates, more traffic accidents, and severe adverse costs in terms of health, life expectancy, and productivity (Green and Sánchez, 2013). These are mostly derived from higher concentrations of GHG, including black carbon and other short-lived carbon pollutants.

Poor urban planning has, for example, increased the concentration and isolation of the poorer segments of the population in the outskirts of urban growth centers where public transit systems are severely undercoordinated (Cervero, 2000). This urban sprawl not only results in longer travel times for the poor (Ardila-Gomez, 2012), but also favors the development of informal transportation alternatives like mini-buses and moto-taxismo, which often do not comply with air emissions quality standards and exacerbate traffic congestion and traffic accidents by operating on unmarked, variable "ghost-routes."

Planned public transit systems offer cost-effective solutions to address these failures, which reflect weak institutional capacities. Developing effective public transit systems is, however, not an easy task. Compensation mechanisms must be developed to integrate informal transport business owners while ensuring compliance with safety and health standards. Many investments in transportation infrastructure are also associated with changes

in land use and a rise in property values, which can further exclude poorer citizens. Finally, the type of investment needed must be adapted to fiscal space considerations as well as to gradual multi-year, multi-modal approaches. Since 2007, investments in urban transport systems throughout Latin America and the Caribbean represented between 1.0% and 1.5% of GDP (Yañez-Pagans et al., 2018).

A direct step toward decarbonization and energy transition is the electrification of the transport sector. Promoting electric vehicles (EVs) and modernizing public transport systems are key to complement recent efforts to deploy and finance renewable energy generation. From a global perspective, this may seem like a major challenge because, even though the share of renewable power generation has increased tenfold in recent decades, fossil fuels still provide 85% of primary energy (Cembalest, 2018).⁴⁵ In this sense, it should be guaranteed that additional renewable generation meets end-use energy demand. Since transport systems compromise a substantial share of energy use, which depends mainly on fossil fuels, they play a major role in shifting the patterns of energy consumption in a sustainable direction. This is especially important for Latin America, where the share of GHG emissions derived from transport systems is higher than the global average. It is also a policy which makes more sense to implement when considering the region's clean energy matrix.

The electrification of transport systems can help achieve climate goals on time and the region's relatively clean energy matrix makes it an ideal candidate for adopting electric vehicles. Electric vehicle adoption directly reduces GHG emissions derived from its energy sources. The IEA (2020c) estimates that, in 2019, the electricity generation used to supply the global electric vehicle fleet emitted 51 Mt CO₂ equivalent, half the amount needed to supply a similar fleet of internal combustion vehicles. Moreover, the electric power-train of electric vehicles is three to five times more efficient than that of their internal combustion counterparts. As the electric fleet of vehicles grows and becomes more efficient, the gains from avoided GHG emissions scale up. This is because road transportation accounts for half of global oil consumption, which is potentially replaceable by electrification (Cembalest, 2018).

Electric Vehicles: On a Long and Winding Road

Electric vehicles provide additional benefits while mitigating climate change. Since an electric fleet generates no tailpipe emissions and produces little noise, it increases health and welfare in dense areas, especially where public transport is comprised of large fleets of buses and routes. These welfare effects are important. An approximate 7 million people die every year from exposure to fine particles in polluted air, and more than 90% of air pollution-related deaths occur in emerging economies (WHO, 2018). Electric bus noise levels, which are 25% to 70% lower than those of traditional buses,

could also increase productivity and the demand for public transport services (Edwards et al., 2018). Electric vehicles also provide indirect benefits while mitigating climate change as they lower levels of air and noise pollution. These facts strengthen the case for EV adoption in urban policy design by presenting its environmental and economic co-benefits and providing yet another example of how sound climate policy can be aligned with sustainable economic development policies.

Given its relatively clean energy matrix, Latin America is well suited for electric vehicle adoption. If the electrification of transport is achieved, energy demand will encounter low-carbon generation sources that contribute to mitigating climate change (Edwards et al., 2018). Electrification is urgent in the region since end-use demand for the transport sector contributes the most to GHG emissions—close to 45% of the total—compared to a global average of 23% (Quiros et al., 2019). The high percentage of GHG emissions from transport relates to the region's position as the most urbanized in the world, with 81% of its population living in cities. And this proportion is expected to surpass 90% in coming decades (UN, 2018). Potential customers are concentrated in specific cities, which will ease targeting from electric vehicle sellers (Laenge, et al., 2018). These higher urbanization rates also result in some of the highest bus usage rates per person in the world. Combined with dangerous levels of air pollution in the largest cities—which, according to IQAir, exceed 20 PM_{2.5} per cubic meter in Santiago, Lima, and Mexico City—and a private vehicle fleet expected to triple by 2050, Latin America and the Caribbean is ripe for the transition to electric vehicles.

The region also enjoys large reserves of minerals, such as lithium and other rare elements, which are critical to produce batteries for electric vehicles and will be in high demand in the near to medium future. Chile has half of the world's lithium reserves and is an important copper producer. In 2018, Chile's national development bank (CORFO) sponsored the creation of a lithium development center. Bolivia and Argentina also enjoy large mineral reserves that can contribute to the processing of raw materials used in batteries. With vehicle manufacturers already established in countries such as Argentina, Brazil, and Mexico, the region is poised to industrialize the production of electric vehicles, or to participate in its global value chains in the not-too-distant future (UN, 2018).

The market for electric vehicles is small but growing rapidly. In 2019, the world electric fleet amounted to 7.2 million units (approximately 500,000 corresponded to electric buses), a significant increase compared with the small fleet of 17,000 EVs in 2010. A similar trend was noted in electric chargers, which increased by 2 million during this period, reaching a global stock of 7.3 million, mostly dominated by private chargers. However, the electrification of transport is still a long way down the road, since the current electric fleet accounts for just 1% of the global total. Moreover, half of the fleet is located in China, and EVs play a very marginal role in Latin America (IEA, 2020c). Regional leaders include Mexico (4,700 EVs in 2019),

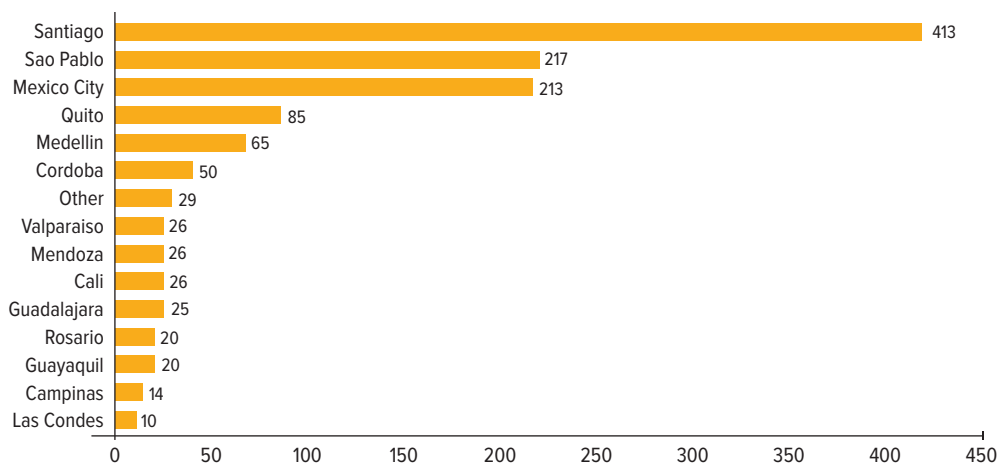
BOX 8**The Case for Policies that Support EV Adoption**

The electrification of transport systems can contribute to achieving climate goals. A direct consequence of electrical vehicle adoption is the reduction of GHG emissions derived from its energy sources. The IEA (2020c) estimates that, in 2019, the electricity generation used to supply the global electric vehicle fleet emitted 51 Mt CO₂ equivalent, half the amount needed to supply a similar fleet of internal combustion vehicles. Moreover, the powertrain of electric vehicles is three to five times more efficient than that of internal combustion counterparts. As the electric fleet of vehicles grows and becomes more efficient, the gains from avoided GHG emissions will scale up because road transportation accounts for half of global oil consumption, which is potentially replaceable by electrification (Cembalest, 2018). The IEA estimates that electric vehicles would cut oil consumption significantly; from the 0.6 million barrels per day saved today, oil demand would shrink between 2.5 and 4 million barrels per day by 2030. Lower oil demand will also enhance energy security and diversification, particularly in oil-dependent countries (IEA, 2020c; Edwards et al., 2018).

Brazil (3,000), and Chile (700). In terms of public chargers, the numbers are still low (Mexico and Brazil are the regional leaders with 425 and 130, respectively).

Lower battery prices and technological upgrades suggest that the mass adoption of electric vehicles could be closer. Battery costs have come down more than 85% since 2010, and battery energy density of current models is between 20% and 100% larger than that of models available in 2012 (see Figure 71). Battery charging speeds are also rising. Given these trends, the IEA estimates there will be between 140 million and 250 million EVs in 2030, accounting for more than 7% of the global vehicle fleet (IEA, 2020c). However, several factors could slow down this pace: infrastructure requirements, insufficient charging stations, and needed grid upgrades. Even though EVs will increase electricity demand by less than 6%, a major challenge is to administer charging energy demand at peak

times to avoid draining the transmission and grid system (IEA, 2020c). The region's natural endowments, its educated workforce, its global integration with China, Europe, and the United States, and its car manufacturing capacities make it an ideal first-comer and active player in the emerging global supply chains for EV manufacturing which will only grow.

FIGURE 71.**Electric Bus Adoption in Latin American Cities, 2020**

SOURCE: Data from LABMOB et al. (2021)

Supporting the EV Transition

Low penetration of EVs in Latin America and the Caribbean reflects the need to design incentives and offer financing options that scale up the market. The most visible challenge relates to the upfront price of EVs, which is much higher than that of internal combustion models. Moreover, while local vehicle manufacturers have the capacity and the educated work force, they mostly lack the experience and some resources to produce EVs (Leange et al., 2018). The small fleet of EVs discourages investments in public chargers which not only generates a vicious circle but may also lead to regulatory lock-in and hamper regional market development and integration due to the adoption of multiple, conflicting charging technological solutions. The purchase of government owned EV fleets can help develop the market, while institutions such as the IDB are playing a role in helping generate knowledge and coordination for the adoption of common standards and regulations for EV charging infrastructure. Another obstacle is the lack of fuel efficiency standards, which ends up favoring inefficient internal combustion vehicles (Edwards et al., 2018).

Unlocking the EV market should be a policy priority. During the last decade, purchase subsidies and tax exemptions that reduced upfront costs were key enablers of electrification in the transport sector globally (IEA, 2020c). Despite technological upgrades and lower battery costs, electric vehicles are still expensive and require different support strategies led by national and local governments. Regarding fiscal incentives, governments have enacted tax and tariff reductions, including in value-added taxes (which account for up to 65% of the vehicle tax structure in Latin America). An innovative approach to tax rebates guarantees their revenue neutrality by increasing taxes to internal combustion vehicles, as in Chile. This allows the tax break to be sustained for longer periods (Quiros et al., 2019). Colombia, Costa Rica, and Ecuador have reduced the electric vehicle VAT, while Brazil, Colombia, Mexico, Costa Rica, and Argentina have lowered or eliminated tariffs. Other alternatives that cut ownership costs include reductions in circulation taxes, tolls, and parking fees.

Nonfinancial incentives include exemptions from driving restrictions or congestion pricing schemes, which have been used in Colombia, Costa Rica, and Mexico. A relevant question is, when will the market be sufficiently mature to phase out some of these incentives? Even though China experienced some blowback to the initial phasing out of subsidies, the IEA estimates that in 2019 lower government direct spending on incentives did not reduce total expenditures on EVs (IEA, 2020c). However, uncertainty persists over when the cost competitiveness (including incentives) of electric vehicles will match that of internal combustion ones. Quiros, Victor and Ochoa (2019) estimate that the cost competitiveness of electric vehicles will be achieved after 10 years of usage in Costa Rica, Panama, and Uruguay, while in Brazil, Chile, and Peru competitiveness will be reached after 17 years. These estimates highlight the need for governments to opt for more ambitious strategies and mandates.

Governments can promote regulatory and structural measures to send long-term support signals to the EV market. Beyond specific tax rebates and nonfinancial nudges, ambitious policy announcements and electric mobility mandates can also encourage EV adoption. Better regulation includes mandates that set zero-emission vehicle targets or fuel-efficiency standards (IEA, 2020c). Also, nationwide mandates can provide clarity to markets. A regional leader in this area is Costa Rica's 2018 legislation for a fossil-fuel-free transport system; the law mandates deployment of public charging infrastructure and setting an EV sales target of 5% by 2030 and 50% by 2040 (Viscidi and Edwards, 2018; UN, 2018). Chile also has ambitious goals for electrification with a national strategy aimed at attaining a 40% private electric fleet in 2040, building on previous fuel-efficiency standards. In turn, Brazil and Mexico have developed strategies to achieve 30% electric vehicle sales by 2030. In Colombia, the goal is set at 600,000 electric vehicles by 2030.

BUS-RAPID-TRANSIT (BRT) SYSTEMS AND ELECTRIC BUSES: LATIN AMERICA AND THE CARIBBEAN AS A GLOBAL LEADER

While bus-rapid-transit (BRT) systems are not always sufficient to deal with all transportation demands, they can be a successful and cost-effective solution. The first BRT system was launched in Curitiba, Brazil in 1971, and others have been adopted in the region as well as in Africa, Asia, and the United States. According to BRT+CoE (2020), Latin America and the Caribbean is the region with the largest deployment of BRTs in the world: 13 countries and 55 cities have an extended network of 1,829 kms that serve an average of 21,032,465 passengers (or 61.8% of all BRT users in the world). One of the main reasons behind this success is that BRTs offer a cheaper alternative to expensive metrorail systems (Global Mass Transit, 2010) and provide cost-effective solutions. They are not, however, problem-free.

Urban infrastructure investments in low-cost BRT systems can boost economic growth while also reducing GHG emissions. Some cities in the region, including Santiago, Bogotá, Medellín, and Cali are going further by transitioning their fleets to electric buses. While diesel, natural gas-operated, and even hybrid buses can reduce emissions, they will not suffice to reach the objectives of the Paris Agreement. Electric buses are key: not only do they have lower operational costs, but they are also essential to address city noise and air quality problems. And while they do not increase GHG emissions, their real effect depends on the composition of the electric grid from which they operate.



BOX 9

Transmilenio: Success and Limitations

The case of Bogotá's TransMilenio is illustrative of the advantages and limitations of BRT. With 113 kms of dedicated roadways (of a planned 380 km), Bogotá was the first city to build a large-scale BRT system—in fact, the largest in the world. The system moves 10.4% of the city's daily passengers (almost 2.2 million users). By 2009, TransMilenio had removed 7,000 small private buses and reduced emissions by more than 59% (Rosenthal, 2009). It also reduced the number of car collisions and traffic fatalities, while saving an average of 20 minutes per day, or a 32% reduction in commuting time (Turner et al., 2012). It increased Bogotá's GDP between 3.1% and 3.9%, and worker welfare by around 3.5-3.9% (Tsivanidis, 2019).

However, increased ridership resulted in a saturation of the system and a poorer ridership experience. This problem can be solved by integrating the existing network with other more expensive transport modalities such as the metro. Further TransMilenio lines are planned to expand the network, but they are expected to have a marginal effect in alleviating existing congestion, thus making the case for further articulated, multimodal solutions.

BOX 10

Transantiago: A Successful Multimodal Approach

Transantiago is an interesting example of a multimodal system. While multiple transit solutions including metro and BRT lines exist in Chile's capital, inadequate coordination led to low ridership, high operating costs, and high automobile use (causing higher health costs). Governance reforms, contract re-tenders, and investments bumped up ridership by 26% in 2017 relative to 2015 levels (Global Mass Transit, 2017). Much work remains to be done to improve Transantiago, but reforms since 2017 show the potential of well-coordinated and articulated multimodal transit systems.



The Next Step: Electrification of BRTs

A straightforward policy to electrify the transport sector is promoting public electric mobility. Different programs, strategies, and goals aimed at replacing internal combustion public bus fleets with electric buses can address an important source of GHG emissions and air pollution inside highly populated Latin American cities while reducing operational costs. Moreover, electric buses fit into urban areas where driving distances are short, and routes can be redesigned for electrification. Also, these strategies signal the effectiveness of electric technologies to the public and thus lead with example, which could boost public support (IEA, 2020c). However, electric public buses entail challenges of their own, such as optimizing the technology of existing routes, deploying charging technologies, replacing old bus fleets, modifying bus depots, and upgrading infrastructure; these other adjustments are not always considered by local authorities (Moon-Miklaucic et al., 2019). In Bogota, limited anticipation of these issues held back scalable electric bus adoption. Moreover, to finance these strategies governments requires an innovative approach to public procurement schemes and public-private partnerships that do not discriminate against electric mobility (Quiros et al., 2019; Viscidi and Edwards, 2018).

Several Latin American countries have mandates to electrify their public bus fleets. The regional leader in this matter is Chile, with a 100% electrification mandate by 2040, and a successful tender, under a private-public partnership, that deployed the largest electric bus fleet outside of China in a 100% electric corridor. Costa Rica's mandate implies the electrification of 5% of the bus fleet every two years. Argentina has reduced tariffs for electric bus imports. Several cities in the region have experimented with electric bus programs that encompass a total of 1,229 vehicles. The major adopters include Santiago, São Paulo, Mexico City, Quito, Medellín, and Cordoba. Electric taxi fleets have also been promoted in cities like Bogota. These cases depict how local governments can complement and move beyond the strategies led by national bodies (UN, 2018).

However, an important challenge for the electrification of bus fleets is financing. Although operational and maintenance costs are lower for electric buses, they face substantial upfront costs, including batteries and charging facilities, which limit the smooth electrification of bus fleets (Li et al., 2018; Moon-Miklaucic et al., 2019). The traditional approach to electric bus financing involves public grants that cover upfront infrastructure and, in some cases, operational costs. Medellín is an example of this approach; the city contracted buses with Chinese manufacturer BYD entirely with public funding. Grants can take the form of direct payments or tax breaks. Within direct financing, innovations for adopting hybrid buses include the use of green bonds or selling buses directly to operators using concessional loans with development banks as direct (Curitiba) or indirect (Colombia) intermediaries for climate funds.

However, electric bus financing requires special legal arrangements and contractual structures that transcend traditional grants or support from development banks. The case of Santiago is noteworthy. Even though previous bus operators were bankrupt and conditions did not allow for raising public transport subsidies, the city managed to convince an energy company (ENEL) to lease buses and chargers to operators while supplying electricity. Importantly, this was done without an explicit mandate or subsidy. The Chinese bus manufacturer, BYD, also participated in this arrangement. A particular non-fiscal incentive that operators received was 14 years of contracted operation, in contrast to 10 years with internal combustion buses (IEA, 2020c; Viscidi and Edwards, 2018). The framework for this strategy involved several stakeholders including utility companies, automakers, and local businesses in the allocation of risks, and the financing and deployment of infrastructure within electric bus contracts (Li et al., 2018; UN, 2018).

Another obstacle to financing electric buses are procurement frameworks. Since the evaluation of public tenders prioritizes technological options with low upfront purchase prices—without accounting for life-cycle operational costs—electric buses are dismissed in assessments. For instance, it has been shown that incorporating life-cycle operation and environmental criteria, and accounting for the unique cost-structure risks of other technologies in tenders can level up the playing field for electric buses. The city of Santiago included such measures when it launched a bid, which also required for the operation of a minimum of 15 electric buses to win the procurement process.

In contrast, Bogota's latest tender did not encourage the adoption of an electric fleet, which ended up benefiting buses that complied with the Euro 6 GHG emission standards. For example, Bogota's tender followed a practice that included remuneration incentives calculated per transported passengers, rather than traveled distances. The latter benefits short-range electric buses. While Euro 6 buses are subject to strict emission standards, their acquisition is sub-optimal when compared to EVs as they also generate negative health and noise impacts. The city learned from experience. Currently, tender requirements are being enhanced to increase winning chances of electric buses (Sclar et al., 2019). Tenders should also consider assigning novel responsibilities to stakeholders, such as maintaining batteries and infrastructure.

An important challenge is the access of cities and subnational governments to credit, which is limited by low credit scores and lack of a clear roadmap to increase the trustworthiness of the projects. In this regard, many projects can only be financed as pilots but lack scalability (Moon-Miklaucic et al., 2019). Here, multilateral financial institutions can play an important role in helping to structure and implement innovative, scalable financial projects. Furthermore, O'Donovan and Frith (2018) state that while most EV buses offer a substantially lower total cost of ownership (TCO) than diesel buses, they still have higher upfront costs. They also indicate that if technology and

mass production have resulted in significant cost reductions, battery-operated electric buses are not expected to match upfront costs before 2030. Finally, they suggest that this challenge may be addressed by designing bus lease programs as well as through targeted subsidies.⁴⁶

A series of comprehensive studies between the GEF, the IDB and the World Resources Institute's Ross Center looked at 16 early EV bus implementation cases, including several in the region. The studies identified three types of barriers to the electrification of BRTs: technological, financial, and institutional (Sclar et al., 2019; Li et al., 2019). While each city will have to deal with its own governance structures, geographical challenges, and economic constraints, these reports show that electric bus adoption is not only doable, but that it offers a serious policy option to help achieve Paris Agreement objectives in the region.

46 It is necessary to note that all mass transport systems rely on subsidies, at least in their capital acquisition phase and often for operationalization as well.



CHAPTER 8

DEVELOPING GREEN FINANCIAL MARKETS

Facing uncertainty and fiscal pressure derived from the Covid crisis and other structural problems, Latin America and the Caribbean needs to identify and attract investments to sustain economic growth. Investments in energy throughout the region provide an example of how additional finance can be mobilized. Sovereign debt emission in Chile and private sector issuance in several other countries are examples of sustainable development and green financial products that provide a solution. Understanding the use of these products and the policies that facilitate their use is a priority. These instruments play a critical role not only in mainstreaming climate policy but also in helping secure funding at more favorable rates and in attaining sustainable development objectives.

THE CASE FOR SUSTAINABLE INVESTMENT

Traditional Instruments

The Covid-19 crisis is revealing how unprepared and vulnerable our socio-economic system is to physical shocks. In contrast to financial shocks, like the ones that caused the 2008-2009 global financial crisis, physical shocks arise from ecological and social constraints that, when violated, may lead to economic collapses and weakened institutions. As discussed in previous chapters, mitigating these class risks requires action on multiple fronts. One effective way to do that is to allocate capital intelligently. This is where finance plays a role.

However, investors face a considerable challenge when considering climate change as they face a market failure known as the tragedy of the horizon, meaning that “short-term horizons in financial markets limit the effective transmission of long-term risk signals and, as such, inhibit a more efficient long-term allocation of capital” (Thomä et al., 2015, p. 28). The most extreme effects of climate change may play out 10 years from now, but they will be shaped by the way capital is allocated today. Without decisive action, this market failure will not be corrected.

Thus, governments must intervene by adjusting financial regulation so that that financial projections consider volatile, long-term, nonfinancial factors such as carbon pricing, climate-related supply chain disruptions, and shifts in consumer demand, all of which may change the underlying economics of a business model that may seem profitable in the short term but is inviable in the long term.

Although insufficient alone, the use of environmental, social, and governance (ESG) finance is one way to ensure greater focus on sustainable investing. Incorporating scientific information in financial decision-making is crucial. Specifically, it should become standard to (i) identify nonfinancial physical risks and (ii) internalize those risks by increasing financial costs in activities pushing the boundaries (or, conversely, reward sustainable investments). If enough economic incentives are available for projects that mitigate climate change, more capital will be allocated to ventures that reduce GHG emissions. In fact, sustainable investing has been incorporating nonfinancial, particularly ESG, metrics into investment policies, especially after the 2008 financial crisis.

Annual global issuance of sustainable debt increased from a mere US\$15 billion in 2013 to US\$465 billion at the end of 2019—a significant increase, yet only 6% of the total global debt issuance that year. In January 2020, BlackRock, the world’s largest fund manager with US\$7 trillion in assets, announced it would double to 150 the number of sustainability-focused exchange-traded funds (ETFs) it offers (Henderson et al., 2020). It also

announced plans to divest from companies in the coal sector while increasing its sustainable assets tenfold from US\$90 billion today to US\$1 trillion by 2030. The announcement claims that sustainability- and climate-integrated portfolios offer investors better risk-adjusted returns.

That is the conclusion of a 2015 meta-analysis of 2,200 ESG research studies by the University of Hamburg (Friede et al., 2015). A full 90% of the studies revealed a positive relationship (or at least a nonnegative one) between corporate financial performance and certain nonfinancial metrics, such as carbon footprint and gender diversity. For example, an energy company with a low carbon footprint, high levels of gender diversity, and both transparent and ethical business practices is less exposed to risks associated with new carbon pricing schemes, low-gender-diversity and gender-based discrimination litigation, and inadequate corporate governance. These nonfinancial factors then translate into lower volatility and better returns for investors in the long run (Ashwin Kumar et al., 2016). As a Barron's piece in 2019 noted, the superior nonfinancial performance of sustainable businesses has proven better than conventional businesses following a profit-only model at reducing volatility and providing resilience in downturn scenarios (Madsbjerg, 2019).

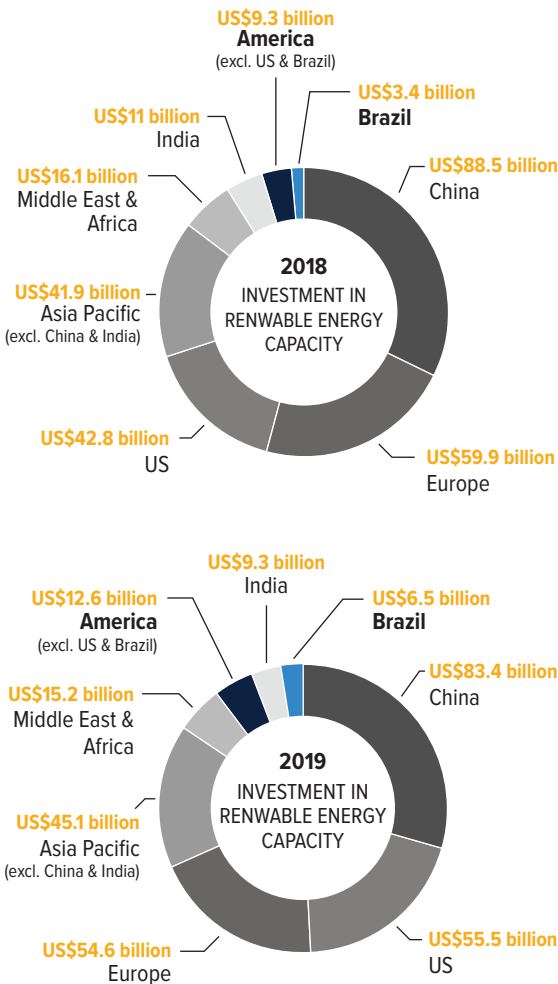
However promising, there are limitations to what sustainable investing can achieve. What metrics truly address sources of physical risk? Is there a standard definition of what “sustainable” and “social” actually mean and how far they reach? What is a “sustainable” investment time frame? How is ESG applied to sovereign actors? These are all questions yet to be conclusively answered. But with all its limitations, renewed emphasis on ESG finance is the best option the world has to avoid major reversals in well-being. Hindering ESG finance are a lack of common standards and the fact that data disclosure is voluntary. There is no consensus on what precisely makes an investment sustainable or which sustainability indicators best account for systemic and physical risk within an investment. A recent announcement by the European Securities and Markets Authority on the creation of guidelines for ESG disclosure and reporting is a step in the right direction (Majoor, 2020). By aiming to create a common language and taxonomy for sustainable finance and requiring financial market participants to disclose the degree of environmental sustainability in their products, the European Union is leading the path in this revolution. The region also offers some examples of how this noise can be reduced. By aligning ESG criteria of the Sustainable Infrastructure framework (Bhattacharya et al., 2019) with country needs and priorities, the Mexico Invest Hub platform (Proyectos México) helps private investors understand how environmental risks are mitigated in public-private and private infrastructure investment opportunities.

A New Wave of Resource Mobilization Options

Clean energy investment in Latin America has risen in recent years. Between 2004 and 2019 investment expanded from US\$1.1 billion to US\$18.1 billion. In 2004, Latin America’s clean energy investment share was 2.5% of a global US\$40 billion, while in 2019 it reached 6% of a global US\$300 billion (see Figure 8.1). Until 2012, investment in the region was mainly driven by Brazil, which was on par with other large emerging markets such as India and China. Since then, other economies in the region such as Chile and Mexico, and more recently, Argentina, have begun to invest widely in renewables. In 2019, these countries accounted for more than 60% of Latin American investment in renewables; Chile alone accounted for 27%.

The rest of the region exhibits small and declining levels of investment (UNEP and BNEF, 2020). Investments must rise substantially in the coming years in order to meet the Paris Agreement targets. Estimates provided by Irena (2019b) suggest that cumulative investments—including new renewable capacity, energy efficiency, and power grids—must amount to US\$110 trillion by 2050. Nearly half of these investments (US\$49 trillion) must be disbursed by 2030 to avoid the tipping point of extreme temperatures. This implies that large annual green investments must be provided soon, far exceeding those seen up to 2019 which amounted to US\$825 billion (Irena, 2020b). Even though green investments have recently reached record highs and renewable investment is triple that in new fossil plants, they still fall short of what is needed to address climate change, which ranges between US\$1.6 and US\$3.8 trillion per year (Buchner et al., 2019). Between 20% and 30% of these investments must be directed toward renewables. This demands a radical shift in the way climate finance is provided.

FIGURE 8.1.
Investment in Renewable Energy Capacity by Region, 2018, 2019



SOURCE: Reprinted from Global Trends in Renewable Energy Investment 2019, by Frankfurt School, UNEP Centre, and BNEF, 2019. Copyright © Frankfurt School of Finance & Management gGmbH 2019.

Even though carbon pricing, energy auctions, and technological and institutional upgrades have created a suitable environment for renewable investments, further effort is needed to unlock the levels of climate finance required to promote a sustainable energy transition in the future. These efforts relate to the nature of green investments, which are usually uncertain and provide low private returns, and how they translate into barriers in financial markets, such as high capital costs. In this sense, renewable investments and projects must be de-risked and made bankable through innovative financial instruments (Irena, 2020c; Steckel and Jakob, 2018). The public sector and multilateral institutions play a major role in enabling and guaranteeing investments in initial stages. Moreover, developing countries and regions such as Latin America must cope with additional challenges related to macroeconomic, financial, and institutional risks and underdeveloped financial markets in order to gain access to climate finance (Flavin et al., 2014).

Green investments are typically hard to finance in markets that favor less-risky projects and shorter time horizons. Green infrastructure and technology is often perceived as capital intensive, with a complex cost structure in which large initial investments take a long time to be repaid (Steckel and Jakob, 2018). Green investments were also traditionally tied to novel technologies and limited standardization in which traditional capital markets lack experience and practice, mostly affecting small and medium-size projects (Irena, 2016a). These technologies require specific financial products that incorporate their unique requirements and payoff horizons (Flavin et al., 2014). Moreover, green investments tend to face large risk premiums that aim to reward high risks and common asymmetric information problems, which end up increasing capital costs and limiting the overall supply of financing (Steckel and Jakob, 2018).

Latin American countries encounter additional barriers to finance renewable investments because of the limitations of their capital markets and other macroeconomic, institutional, and energy market-related risks (Vazquez et al., 2018). The region lags in the provision and diversification of adequate capital sources and financial instruments such as credit lines, refinancing, and guarantees (Irena, 2016b). Besides, local financial markets lack experience, knowledge, and networks to discover profitable projects and climate funding options (Flavin et al., 2014; Irena, 2016a).

Given the extent of financing barriers to green investments, public development financing institutions and multilateral banks have played a major role in financing renewable projects. In recent years, the role of these institutions has been reshaped toward that of a catalyzer, more than a direct funder, of private investments.⁴⁷ Several tools are available to promote green investments. For instance, hybrid loan structures, such as subordinated debt and convertible grants, attract private investors by funding riskier stages of renewable projects until revenue starts to flow. Another option is interme-

47 However, this is still compatible with public funding of larger projects that otherwise would not be bankable (Irena, 2016b).

diary financing, in which public and multilateral institutions use their solid credit scores to borrow at competitive interest rates from private institutions to partially fund green projects. Loan syndications, such as those used in Mexico, are another possibility; in this modality, a group of financing agents gathers to fund green projects under the guidance of public and multilateral institutions that take charge of the early, and thus risky, stages (Irena, 2016a). These strategies build up the confidence of private investors, who tend to be more comfortable financing other sectors, while exposing them to novel renewable investments.

The efforts of public and multilateral financing institutions are complemented with additional instruments aimed to mobilize and de-risk private renewable investments. Their main feature is to shift the capital requirements from public finance—which usually competes with other priorities—to the private sector while covering risks and promoting better practices. Examples include guarantees and securities, liquidity facilities, refinancing options, and currency hedging. Technical assistance, investment frameworks, or standards regarding good practices have also played an important role (Irena, 2016b). Several Latin American countries have advanced in the use of these instruments. In Argentina, for example, the RenovAr agency covered payment obligations from the public utility and, at the same time, the World Bank guaranteed these payments from exchange rate volatility (Vazquez et al., 2018). In Chile, the Economic Development Agency hedges risks from venture capital funds that invest in green technologies (Irena, 2016b).

Because public funding directed toward renewable investments is expected to be stable in the coming years, private financing must be scaled up to cover the deployment needed to mitigate climate change. In this sense, the private sector should leverage its investments with the tools offered by public and multilateral institutions to acquire both relevant experience and confidence and provide efficient risk assessments. Thus, complementarity between both types of investors is a key element to ensure the stream of financing. This experience should also be used to fill investment gaps that public and multilateral institutions do not fully cover, such as refinancing, short-term loans, and the acquisition of operating assets (Irena, 2016b). Moreover, public support through partial loans must be gradually replaced by equity and venture capital, which tend to finance the early stages of projects, thereby enhancing the financial value chain of renewable investments. Guarantees and securities can help boost these financing plans, as in Chile.

Climate funds play a significant role in leveraging green investments in Latin America. These specialized funds provide a wide variety of capital resources—grants, debt, concessional debt, mezzanine finance, guarantees, and equity—to project developers, all under standardized frameworks that offer confidence to investors and scalability to project managers. Their global coverage integrates local developers with international investors and financing institutions. Additionally, their specialization helps them address several risks that multilateral institutions cannot, even though multilaterals have

helped craft some of these funds. In fact, the largest contributor to climate finance in Latin America is the Clean Technology Fund (CTF) of the Climate Investment Funds (CIFs), which is managed by the World Bank and executed through joint implementation plans developed by regional development banks and countries. The CTF has provided more than US\$900 million for 31 green projects around the region. In Chile, the Climate Investment Funds, IDB Invest, and ENGIE developed a pilot program that monetizes efforts to reduce energy-related emissions to incentivize the transition by decommissioning fossil fuel generation and investing in renewable energy infrastructure. This fund is followed by the Green Climate Fund, the Amazon Fund (specialized in Brazil), and the Global Environmental Facility. Together, these four funds provide 75% of climate finance in the region, especially in Brazil, Mexico, and Chile (Schalatek and Watson, 2020). Table 8.1 presents the regional landscape of climate funds between 2003 and 2019.

A major potential source of private capital is institutional investors, such as pension funds, insurance companies, and sovereign wealth funds, which can provide more than US\$2 trillion per year to fund renewable energy (Irena, 2016a). In recent years, their interest in sustainable investments has grown considerably and is expected to continue in that direction, driven by the preferences of investors, sustainable company standards, better risk assessments of renewable projects, and social responsibility mandates (Vazquez et al., 2018). There is also an opportunity to attract domestic capital while promoting local market deepening. However, domestic regulation could limit investments to certain projects, especially low-risk and large-scale ones (Irena, 2016b).

INTERNATIONAL EFFORTS TO ENCOURAGE SUSTAINABLE INVESTMENT

Beyond ESG finance, specific debt instruments such as green bonds or SDG bonds have proliferated in recent years. Sustainable finance is a key link between macroeconomic and climate policies. The emergence of peer-to-peer exchange networks such as the Coalition of Ministers of Finance for Climate Action, or the Network for Greening the Financial System play an important role in the incorporation of economic authorities in the climate space. Their ownership of the topics is indeed critical to successfully support the use of NDCs as planning policy instruments.

In January 2020, the United States Federal Reserve announced its decision to join the Network for Greening the Financial System (NGFS). Created

in December 2017 at the One Planet Summit in Paris, the NGFS aims to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments for sustainable development (Mair, 2020). One way to think about the role of the NGFS is to design financial regulation in order to tackle the tragedy of the horizon, which arises when the physical and economic impact of climate change is not synched in time with the shorter-term incentives that drive business decisions, the political cycle, and even the horizon of technocratic authorities like central banks (Carney, 2015).

The NGFS functions as a platform to discuss best practices in green finance. As of July 2020, the NGFS has 69 members and 13 observers, including five Latin American countries (through either their Central Bank or their Securities Commission). In the case of Mexico, a founding member, both institutions belong. The other country members are Brazil, Chile, Colombia, and Costa Rica.

In parallel, the Financial Stability Board created a Task Force on Climate-related Financial Disclosures (TCFD) to develop voluntary, consistent climate-related financial risk disclosures for companies to use in providing information to investors, lenders, insurers, and other stakeholders. The TCFD (2017) developed a framework for disclosures to inform financial markets on climate risks around four thematic areas: (i) governance; (ii) strategy; (iii) risk management; and (iv) metrics and targets. The purpose is to show climate concerned investors how issuers are safeguarding against the consequences of climate change.

The Global Sustainable Investment Alliance (GSIA) tracks issuances and demand for sustainable investments in five key financial markets: United States, Canada, Japan, Australia and New Zealand, and Europe. The 2018 biennial report (GSIA, 2018) found a 34% global increase in sustainable assets from 2016, amounting to US\$30.7 trillion at the start of 2018, with 39% (US\$12 trillion) in the U.S. market and 46% in Europe. Krueger, Sautner, and Starks (2020) report that more than half of all surveyed investors declare they are already factoring climate risks, including regulatory risk, into their decision-making process.

In the spirit of debt relief, rather than new sources of financing, some countries have advocated for the use of debt-for-climate, debt-for-sustainability, and even debt-for-forests swaps in which multilateral and private creditors provide debt relief in exchange for climate action, progress in sustainability metrics, and reforestation by debtor countries. However, as promising as these vehicles may sound, they are far from ideal for providing large amounts of structural financing in the short- to medium-term. Debt-for-nature swaps have existed since the 1980s and have faced severe obstacles, such as limited scalability potential, weak accountability mechanisms for debtor countries, and misaligned incentives where most (if not all) private debt holders are unwilling to forgo debt payments in exchange for a public good.

SUSTAINABLE FINANCE IN LATIN AMERICA AND THE CARIBBEAN

SDG-Linked Bonds

SDG bonds are linked to specific subsets of the Sustainable Development Goals and should have a lower cost of capital than conventional sovereign bonds. If the goals set out by the terms of the bond are met, countries would have to pay lower coupons. In principle, by embedding sustainability considerations within sovereign debt, an investor should be able to mitigate environmental, social, and governance (ESG) risk at the country level. SDG-linked debt aligns long-term fiscal sustainability with economic and environmental sustainability.

Innovative structures can also be used by private issuers. In fact, the US\$1.5 billion sustainability-linked bond issued by ENEL (the Italian multinational energy company) in late 2019 is a good example. As opposed to a traditional green bond, proceeds from ENEL's sustainability-linked bond are not earmarked for specific projects or investments. Instead, much like a conventional corporate bond, the funds can be applied to operating expenses or capital expenditures without any specific ESG requirement. However, ENEL's bond coupon rate is variable and depends on the company meeting a specific performance target, namely the increased share of its renewable energy installed capacity from 46% in 2019 to at least 55% in 2021 (BNP Paribas, 2019). If the company is unable to meet the target, the bond's coupon rate will increase by 25 basis points. Similarly, Latin America's first sustainability-linked bond issuance by Brazilian pulp producer Suzano will have a 10-year maturity and embed a 25-basis points coupon step if the company fails to reduce gas emission intensity by 10.9% from a 2015 baseline by 2025. This key performance indicator will be reviewed by an independent third party, giving greater confidence to investors. This structure eliminates the need for an earmarked use-of-proceeds approach. Issuers are also able to better administer funds without being limited to specific investments, while the ESG audit burden is reduced, since only initial baseline and end-line assessments of the targets in question are required. This is the case of Mexico's recent issuance of the world's first SDG sovereign bond in September 2020 (UNDP, 2020). The seven-year US\$890 million bond comes following the development of an "SDG Sovereign Bond Framework" with earmarked use of proceeds and impact reporting requirements. If credit rating agencies are able to incorporate the lower socioenvironmental risks that result from SDG sovereign bond issuance into sovereign credit ratings, any conventional debt issuance would inevitably result in higher downgrades than its equivalent in SDG bonds. Much work remains to be done. In some cases, the monetization of environmental goods is an issue in itself: the case of biodiversity illustrates these problems perfectly, although it is noteworthy that 20 years ago, people doubted that climate action could be monetized beyond carbon markets.

Green Bonds

New business models and investment vehicles should be developed in domestic capital markets to further boost private investment in renewable energy. This strategy could attract skeptical investors while leveraging all stages of financing for renewable assets (Irena, 2020d). A capital market option that is receiving major attention is green bonds. These fixed income securities provide capital for climate-related or sustainable projects (Steckel and Jakob, 2018). Their issuers are diverse and range from corporates, to financing institutions, and subnational or national governments (Irena, 2016b). By labeling green investments they have demonstrated efficiency in providing solutions to address the financing gap for renewables. For instance, they lower financing costs by correcting the mismatch between long-term refinancing and short-term bank liabilities. They also lower transaction costs for investors willing to accept lower returns in exchange for sustainable investments, including institutional ones. Additionally, multilateral and public financing institutions serve as intermediaries by backing up green bond issuances to connect firms and financial markets (Steckel and Jakob, 2018). Governments have also promoted green bonds to meet national climate targets (Irena, 2020e). However, barriers that limit the adoption of green bonds in developing regions include the lack of local investor demand and limited clarity regarding the benefits and standards of their issuance.

The green bond market has become an attractive investment vehicle in recent years. In 2019, green bond issuances reached record-high levels of US\$190 billion. Despite recent advances, green bond adoption is limited in Latin America, which has contributed just 2% of the cumulative global issuance volume between 2004 and 2019 (US\$12.8 billion of a global total of US\$636 billion). Brazil leads in this area with 41% of the regional issuance volume, followed by Chile with 25%, and Mexico with 14%. Five additional Latin American countries have reached green bond deals, but they only account for 5% of total issuance. Figures 8.2a and 8.2b present cumulative green bond issuance in Latin America since the first bond was issued in Peru in 2014. The case of Chile is noteworthy since it conducted two sovereign green bond issuances in 2019, one of US\$1.4 billion in June and one of EUR\$861 million in July, mainly to finance public transport initiatives. Colombia, Mexico, and Peru are expected to follow suit soon. Regional issuers also vary widely from country to country: in Brazil, they are non-financial corporates, in Mexico, development banks; in Argentina, local governments; in Chile, sovereign deals; and in Colombia, financial corporates. Green bonds in the region are mostly directed toward energy projects, half of which are renewables, followed by transport and land use solutions. Recently, the region has also begun issuing wider non-green labeled bonds, such as social or sustainability bonds (Climate Bonds Initiative, 2019). At a global level, initiatives like the creation of two Green Bond Funds for Central Banks with US\$2 billion for investments also sends a strong signal to policymakers.

FIGURE 8.2A.

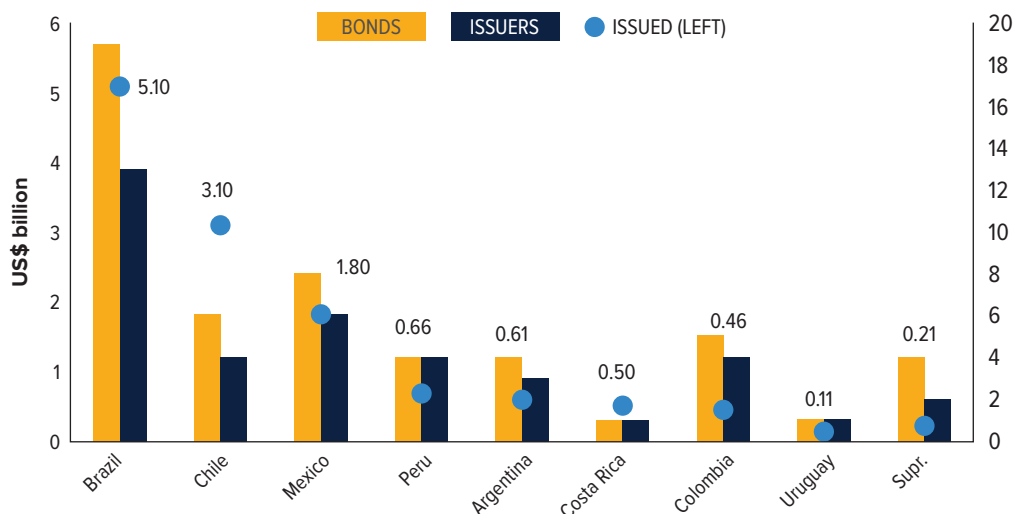
Cumulative Green Bond Issuance as June 2020



SOURCE: Reprinted from Green Bond Market Summary, H1 2020, by Climate Bonds Initiative, 2020.

FIGURE 8.2B.

Cumulative Green Bond Issuance in Latin America from 2014 to June 30, 2020



NOTES: Supr. stands for Supranational

SOURCE: Reprinted from Green Bond Market Summary. H1 2020, by Climate Bonds Initiative, 2020.

ROOM TO GROW

In a recent IDB study, Frisari et al. (2020) analyze climate risk financial regulation and supervision in Latin America. The study finds that in Latin American and Caribbean countries —unlike the more advanced member countries of the NGFS and TCFD networks— the availability of relevant data is underdeveloped and fragmented, and institutional coordination is inadequate. The study also finds that the experiences of Brazil, Chile, Colombia, Mexico, and Peru offer insights into how to strengthen and develop other financial markets in the region.

As shown by the Climate Bonds Initiative's Green bond market summary, H1 2020 (Climate Bonds Initiative, 2020), between 2016 and June 2020, Latin America and the Caribbean attracted US\$17.9 billion through green bond emissions, well below the markets in Asia-Pacific (US\$194 billion) and Europe (US\$362.7 billion).⁴⁸

Private sector tailored solutions are needed to fully mainstream the climate equation into business lines. In a region where micro and small enterprises represent 67% of employment and 99% of all productive units (Ferraro and Rojo, 2018), working on financial markets is only one side of the equation.

⁴⁸ Including US\$7 billion in sovereign green bond issuance by Chile.

The other side must consider a bottom-up approach that focuses on firm competitiveness and business models. IDB Invest takes such approaches. Besides promoting a sustainable financial sector, the region can adopt other dedicated green financial instruments that help crowd-in finance for sustainable projects (Meirovich, 2019). In Chile, IDB Invest played an important role in helping the country take its 28 thermoelectric powerplants offline without harming the sector's competitiveness; these powerplants represented 40% of Chile's carbon footprint. Effective mainstreaming of climate in the region's private sector must focus on attending the climate-related competitiveness threats. This requires generating specific data as well as translating all existing vulnerability and relevant climate modeling data from its scientific sources into actionable information that can feed into the structuring of projects. Also relevant is the design of comprehensive business models that incorporate sustainability considerations to allow for efficiency savings throughout the entire value chain. Most importantly, these solutions must be sector-tailored approaches.

Finally, the LatinSIF initiative, together with PRI (Principles for Responsible Investment), created a Latin America advisory committee (Brazil has a separate one) that works as a network for financial actors with shared interest in this area. Overall, the region still has a long way to go, as evidenced by current ongoing debates over whether national actors should develop their own taxonomy regulation to identify economic activities that can be treated as environmentally sustainable. This requires a long process in which private and public actors must engage with regulators to develop a cohesive set of norms that is relevant and suited for each country. Financial markets in Latin America and the Caribbean vary widely, further highlighting the need for domestic appropriation and development to incorporate the financial and legislative requirements of each country. The PRI approach allows for such efforts and helps advance the agenda through its convening power. IFIs also play a significant role in generating knowledge and convening power to advance domestic agendas.

CHAPTER 9

TOWARDS A GREEN POST-COVID-19 RECOVERY

Sustainable plans to revitalize the economy, including the adoption of low-carbon growth pathways, are already underway in places where the pandemic has subsided. The E.U. Green Deal stands out as an example. The plan presented by the United States to “Build Back Better” does as well, but it must still be translated into policy. As institutions like the IMF actively call for green recovery packages and include the evaluation of climate policies under its periodic article IV consultations, the question of how to design these in Latin America and the Caribbean becomes highly relevant. Promoting an ambitious green recovery may not necessarily require one-off stimulus packages, but rather a stronger push for the mainstreaming of climate and environmental policy.

ANOTHER LOST DECADE? A PROPER RESPONSE TO THE COVID CHALLENGE

From a health perspective, the pandemic has hit Latin America and the Caribbean hard. As of December 2020, the region accounted for a third of the world's Covid-related fatalities. An already vulnerable region with weak institutions and pervasive inequality is now in the midst of an unprecedented crisis. The rapid spread of the pandemic in the region is the result of a combination of factors, including inadequate health systems. In March 2020, the Pan-American Health Organization (PAHO) launched an appeal for funds to provide technical assistance to address five structural limitations in the region's ability to manage the health crisis: (i) insufficient subnational and national capacity to identify and prevent imminent disease outbreaks; (ii) laboratories unequipped to supervise and monitor the evolution of Covid-19; (iii) inadequate overall national readiness and referral protocols for intensive care units; (iv) insufficient infection prevention and control capabilities (only half the countries in the region had protocols); and (v) dramatically unsatisfactory risk communication campaigns (PAHO, 2020). In addition to these problems, the region's health expenditures are lower than in advanced economies. According to the OECD database, the region's member countries have only 2.1 beds (per 1,000 population) compared to an average 4.7 beds in overall OECD countries (OECD, 2020).⁴⁹

According to the Economic Commission for Latin America and the Caribbean (ECLAC), universal healthcare in Latin America and the Caribbean is almost nonexistent, national health systems are fragmented, and over 47% of the region's population lacks social security coverage (Barcena, 2020). More than 58 million Latin Americans aged 65 or older do not have health insurance. These limitations in health insurance and infrastructure are key drivers of pandemic-related problems. However, high levels of informal employment have also played a role. According to a recent IDB report, informality accounts for 56% of total employment in the region (Arboleda et al., 2020).

Informal jobs —which mostly require human-to-human contact— have been particularly affected by lockdowns. Meanwhile, inadequate safety nets have forced people to leave their homes so they can make ends meet. These factors have aggravated matters from the public health perspective, as lockdowns become both harder to enforce and less feasible politically. Unemployment rates also remain high. The recession is likely to be significantly more severe and profound in Latin America and the Caribbean than in other regions. Not only does the region face a recession, characterized by negative growth and high unemployment, it also risks losing at least two decades of progress reducing poverty and inequality.

49 Latin American and Caribbean members of the OECD are Chile, Colombia, Costa Rica, and Mexico.

Given the magnitude of the crisis, governments are prioritizing the preservation of lives and livelihoods by putting more resources into the health sector, providing subsidies to businesses, and supporting household incomes with cash and in-kind transfers. This is not a traditional economic recovery strategy. It is a disaster-relief response. Transitioning from preservation to recovery will be the next phase in dealing with the crisis. While the two types of responses will overlap, recovery packages will gain an increasing amount of attention.

At a global scale, sustainable plans to revitalize the economy, including the adoption of low-carbon growth pathways, are already underway. Such is the case of the United States and the European Union. In the E.U., an aggressive spending plan prioritizes clean energy and connectivity infrastructure, R&D, and education. These items account for 25% of recovery efforts. Stimulus plans that promote a green recovery are also in effect to some extent in China and India. China's government launched the New Infrastructure Strategy based on renewables, electrification of various industries including transport, and digitalization (also called REED). India announced the electrification of its rail system using solar energy as part of its Covid-19 economic recovery strategy.

In Latin America and the Caribbean, where economic recovery measures are still in the design phase, and often unconnected from programmatic approaches, the Covid-19 health crisis and its consequences will surely shape the region's policy agenda. However, green measures are possible. Under its economic packages, Chile's Finance Ministry indicated that it would prioritize public works for which funds can be quickly disbursed, and emphasize both sustainability and climate mitigation. Given the severe social and economic implications of insufficient access to water in the country, these plans will include dams, potable water projects in rural areas, irrigation, and similar items.

IS A GREEN RECOVERY FEASIBLE IN LATIN AMERICA?

Clearly, Latin America and the Caribbean is different from Europe when it comes to the role that green growth programs, such as Germany's Energiewende or the UK's Green Industrial Policy efforts, can play in the post-Covid response (Altenburg and Assmann, 2017). The pre-Covid situation, as well as the consequences of the pandemic, will be important determinants of the type of response. Countries where planning and regulations to support the ecological transition were already in place are likely to take advantage of the current crisis to speed up national discussions to achieve a growth pathway compliant with the Paris Agreement. For

this group of countries, the current crisis will serve as a catalyst for climate action.

In addition to a greener, more ambitious budget, the European Union also approved a temporary financial instrument to launch a green fiscal stimulus package, for a total of EUR1.8 trillion. The objective of the budget and this new instrument (NextGenerationEU) is to support the European Green Deal. NextGenerationEU represents a EUR750 billion recovery package that has three main pillars. The first supports investments and reforms to address the crisis and includes a recovery and resilience facility for the design and implementation of sustainable green recovery plans. Resources allocated to the Green Deal also include the Just Transition Fund as well as the European Agricultural Fund for Rural Development. A second pillar focuses on kick-starting the EU economy through private investment. A third pillar, albeit smaller, will strengthen the EU's health readiness.

Europe is not alone in pushing for a greener transformation during the post-pandemic. In Canada, the government announced that access to the federal government's Large Employer Emergency Financing Facility (LEEFF) will be conditioned on green policy compliance. The facility, which lends resources to companies with annual revenues of over CAD300 million per year, requires beneficiary companies to release climate-related disclosures as per the suggestions of the Task Force on Climate-Related Financial Disclosures (TCFD). In September 2020, New Zealand became the world's first country to enforce mandatory climate-related financial disclosure by 2023 (Ministry for the Environment, New Zealand, 2020). Several emerging countries are also making the green recovery central to their stimulus packages. China's New Infrastructure Strategy and India's solar-powered rail system, both mentioned previously, are cases in point.

Independent sources, however, are more skeptical of these efforts. The Green Stimulus Index and the Energy Policy Tracker show that a significant share of stimulus funding is geared towards brown activities intended to support more traditional sectors of the economy and maintain employment (IISD et al., 2020).⁵⁰ The question is whether it is possible to include a green component in Latin America and the Caribbean's economic recovery packages.

On Earth Day, April 22, 2020, IPSOS launched a survey in 27 countries (including six in Latin America and the Caribbean) to gauge public opinion on whether the economic recovery should be green.⁵¹ Respondents agreed with the idea of a green recovery in general. But when asked more specifically if economic recovery should be conditioned on specific mitigation actions, responses varied enormously (Boyon, 2020).

50 The Green Stimulus Index examines 11 major economies to assess the green vs. brown orientation of their stimulus funding based on: (i) the scale of funds flowing into environmentally relevant sectors; (ii) the existing green orientation of those sectors and; (iii) the efforts to steer stimulus toward (or away from) sustainability.

51 The six Latin American countries in the IPSOS survey were Argentina, Brazil, Chile, Colombia, Mexico, and Peru.

Many actors have called for green recovery packages, including in Latin America. The question is, how can this be achieved? One important element is the ability to generate jobs. An ILO/IDB report estimates that a decarbonization plan could create up to 15 million net jobs in the region by 2030, while reducing GHG emissions by 35% (Saget et al., 2020). This is not enough to make the case for a green recovery: policymakers face the challenge of creating jobs in the short run to provide for the income needs of the poor and vulnerable. This means that in seeking growth-driven job creation that is green, it is important to consider the required skillsets and costs, as well as the timeframes for implementation. In many countries, this transition will take time as policies for skills retraining and job reconversion have to be in place.

But action is possible, as suggested by Chile's decision to close its coal plants. In many cases throughout the region, the problem is not the transition itself, but rather the lack of actionable evidence and transformative initiatives to convince both workers and policymakers that it is possible to proceed in a fair and socially responsible way. Identifying the groups that are adversely impacted by the transition while offering retraining and reconversion options is critical. Finally, and to mobilize and inject the sums required to recover from the consequences of Covid, the role of regional and multilateral international financial institutions will be critical. These can also provide technical assistance and guidance to support finance and planning ministries in identifying the best recovery policies that allow for a sustainable recovery, in line with the Paris Agreement.

Do-No-Harm Policies: The Case of Stranded Assets

Whether they consider programmatic green recovery paradigms, or one-off reactivation measures, policymakers should be particularly aware of pitfalls they need to avoid. Caldecott et al. (2014) explain why and how climate stranded assets merit special attention.⁵² In keeping with a no-harm to climate goals recovery strategy, these investments should not be part of a recovery phase. The issue of investments in stranded assets highlights the need for planning and finance ministries to participate in the definition of NDCs and their overarching Long-Term Strategy documents as well as in their implementation. Not getting involved will not only lead to Paris-incompatible approaches and their consequences in terms of competitiveness in global trade, but it will also result in waste. On a global scale, fossil fuel energy infrastructure in 2018 is already at odds with the 1.5°C target. Additional investments in this type of infrastructure are thus unwarranted. Rather, early retirement of energy generation units (or expensive retrofitting) is needed (Tong et al., 2019).

According to Gonzalez-Mahecha et al. (2019), building all planned or announced fossil fuel power plants in Latin America and the Caribbean

52 See Caldecott et al. (2016) for a detailed definition of stranded assets.

would double emissions relative to the 2019 level (6.9 GtCO₂e). That, as previously mentioned, was already above the level consistent with the 1.5°C to 2.0°C warming targets. On a global scale, recent estimates also suggest that 60% to 80% of publicly listed fossil fuel reserves must be considered “unburnable” if the world is to avoid disastrous climate change, potentially costing the fossil fuel industry US\$28 trillion in revenues over the next two decades (Kepler Cheuvreux, 2014). This also raises the issue of the fiscal gaps that may arise from unburnable oil and gas. In fact, Bradley, Lahn, and Pye (2018) highlight that future oil production prospects are highly uncertain. A report by Irena (2017) makes the case that as alternative technologies become cheaper and measures to address climate change and implement the Paris Agreement take hold, oil demand is expected to slow down. In our region, planning and finance ministries must be wary of these dynamics and a case-by-case approach is warranted when deciding whether to continue investing in oil and gas.

Asset stranding dynamics are particularly relevant for the region in two critical sectors: agriculture and tourism. The case of ski resorts that are no longer economically viable in Europe—due to climate change—is illustrative (Agrawala, 2007; Funk, 2015). Latin American and Caribbean countries must identify where tourism infrastructure is at risk. That can help anticipate upcoming economic disruptions and avoid additional investment in large tourism infrastructure in similar areas (WTO and UNEP, 2008).

Opportunities for Green Investments during the Recovery

Fortunately, numerous green and shovel-ready projects can help create jobs while assisting in the transition towards a Paris-compatible development path. A focus on investment in sustainable and resilient as well as labor-intensive infrastructure is viable. As mentioned, Chile’s recovery packages prioritize investment in public works that are geared to mitigation and adaptation and address the social urgency of water access. Korea’s response to the 2008 financial crisis with a stimulus package focused on building efficiency, transportation, and river restoration is another example. The program, financed by the World Bank, achieved significantly rapid disbursement rates (Hallegatte and Hammer, 2020).

Reforestation is another interesting opportunity. In March 2020, the Pakistan Institute of Development Economics identified potential employment losses of up to 19 million people because of Covid-19, with almost 70% of those in one province, Punjab. In response, the government scaled up its “Billion Tree Tsunami” initiative and created more than 63,000 jobs in reforestation (Khan, 2020). These low-skilled positions buoy demand while temporarily lowering unemployment. While not significant compared to total possible job losses, the approach is modular and can be upscaled. India, for example, sustains approximately 80 million individuals by providing temporary manual labor in rural areas through the Mahatma Gandhi National Rural Employment

Guarantee Act of 2005.⁵³ However, to upscale these programs and avoid negative spillovers, existing frameworks and strategies must proceed with proper reforestation/afforestation and landscape management.

The approach is not novel. Between 1933 and 1942, the United States launched a green public works program, the Civilian Conservation Corps (CCC), which then became the New Deal. One of the objectives of the CCC was to slow down the entry of the young (ages 18-25) into the job market (Bass, 2013). Today, many states and some cities in the United States and Canada operate similar programs, although on a smaller scale. Modern-day initiatives in Latin America and the Caribbean could target regional poverty hubs with high unemployment while improving land management and strengthening the tourism sector. Sustainable landscape management and policies to develop and improve national park systems offer an interesting example. Focusing on sustainable coastal management and particularly on mangrove management would deliver critical win-wins. A lesson learned from the 2001 recession and the 2008 financial crisis is that these economic shocks have long-lasting effects on the social and economic development of youth (15-35 years old) (Sironi, 2017). In the same spirit, short-term programs launched by the US Department of Agriculture (USDA) under the American Recovery and Reinvestment Act of 2009 highlight the role of forest service projects to sustain rural areas and address some of the most urgent economic consequences of a recession (Charnley et al., 2011). The restoration of degraded forests and landscapes is not only a stop-gap solution for employment levels. It can also generate other benefits (Global Commission on the Economy and Climate, 2014). Longer-term investments in rural broadband infrastructure, as recommended by the USDA, are also part of the solution (American Broadband Initiative, 2019).

Creating More Fiscal Space: Debt-for-Nature Swaps and Other Solutions

Given the fiscal constraints of Latin American and Caribbean governments, debt-for-nature swaps can help with a green recovery while addressing national debt levels. As debt restructuring mechanisms, debt-for-nature swaps aim to reduce the public debt burden in exchange for natural capital investments. Partial debt forgiveness is conditioned on the debtor government's commitment to fund parks and protected areas or direct the accrued savings to a local trust fund that will finance conservation projects. Typically, a conservation organization will purchase debt at a discount from existing creditors. The organization will then issue a new instrument to the government, forgiving a portion of the debt and often extending the payment terms. As a result, the country's annual debt service is reduced, freeing up cash flow to invest in natural capital. The most common form of debt-for-nature swaps to date are bilateral swaps; the United States is by

53 The program is not without its faults and many aspects have been severely criticized, but evidence identifies successful landscape management initiatives.

BOX 11**The Amazon Initiative and the Bioeconomy Fund**

At the annual meeting of its Board of Governors held in Barranquilla (March 17 – 21, 2021), the IDB Group announced the launch of an initiative for the sustainable development of the Amazon region, in response to the Leticia Pact mandate it was given. The initiative will, promote and foster programs financed by the IDB Group in Amazon territories. President Claver-Carone of the IDB Group also revealed a specific facility that will support the initiative with the mobilization of up to US\$1 billion to the region through the IDB, together with the Green Climate Fund (GCF) and bilateral and private sector donors. This announcement was accompanied by the launch of an IDB technical assistance fund of US\$20 million, as well as US\$4 million in seed capital, to support bioeconomy start-ups (the IDB Lab/Natural Capital Lab Regenerate Fund).

The initiative includes projects and activities under four pillars: (i) bioeconomy; (ii) agriculture, silvopastoral production, and sustainable forest and landscape management practices; (iii) human capital development; and (iv) infrastructure and sustainable cities. Building on successful practices in climate policy, the facility will include close collaboration with ministers of finance to develop sustainable investment plans which will channel resources and effective developmental outcomes to sub-national territories.

far the largest originator. Conservation organizations, however, are increasingly mobilizing third-party capital to finance these debt swaps.

Since the amount of debt owed to foreign governments is relatively small, there is a limit to the number of potential direct swaps. For the mechanism to have a significant impact, debt must be purchased at a discount from nonofficial creditors, engaging multilateral organizations like the IDB, and conservation NGOs to facilitate transactions where debt is transferred at a discount.

According to Watson (2020), successful debt-for-nature restructuring instruments require proper governance for the use of funds. They need bankable project pipelines, institutional government oversight and execution capacity, as well as coordination between relevant government ministries and civil society. Government actors, namely ministries of finance, which negotiate debt deals, and the ministries of environment, which are generally tasked with developing environmental performance indicators and delivering results, must also coordinate their work.

Mainstreaming Biodiversity in Policy at the Local Level

Such as ministries of finance played a critical role in helping countries understand and adapt the Stern Review to their immediate needs, so too must they understand the economic opportunities and challenges of conservation policy-planning to help in its mainstreaming. And if conservation finance has come up with many solutions, the lack of a coherent policy-framework to tie these one-off solutions within the domestic policy agenda reveals large knowledge and policy gaps. Ultimately, leaders in the region have a political mandate to provide effective sustainable development by reconciling economic and sustainable development agendas with an emphasis on protecting the environment. This mandate means that global and regional agendas must respond to the local context, whether rural or urban. The Amazon countries acknowledge this principle; they understand that investments must generate a better quality of life in Amazon territories while recognizing the potential of natural assets for the bioeconomy and

sustainable development. This acknowledgment led these nations to give the IDB a mandate at the second meeting of the Leticia Pact (on August 11th, 2020) to formulate an Initiative for Sustainable Development investments in Amazon territories, establish a bioeconomy multi-donor fund focused on the Amazon, and help address an economic recovery from the Covid-19 pandemic.

Changes in Regulatory Standards

Given limited fiscal space, private sector resources will be especially critical for the recovery in coming years. The question is how to attract private investment using regulatory standards, such as ESG criteria, as drivers. Supporting green investments with public funds can be complemented with adequate regulation. Climate goals can be achieved if subsidies to firms—such as payroll support or credit guarantees—are made contingent on compliance with ESG standards. One good example is the EU’s recently enacted Sustainability Taxonomy Regulation, a framework for classifying economic activity as environmentally sustainable.

An added benefit of the standards is to reduce “greenwashing,” a phenomenon in which financial products are marketed as environmentally sustainable without sufficient factual basis for their claims (Valentine et al., 2020). The EU’s regulation establishes six environmental objectives: (i) climate change mitigation; (ii) climate change adaptation; (iii) sustainable use and protection of water and marine resources; (iv) transition to a circular economy, including waste prevention and an increase in the uptake of secondary raw materials; (v) pollution prevention and control; and (vi) protection and restoration of biodiversity and ecosystems.

Large, listed companies, banks, and insurance companies with more than 500 employees will be required to make disclosures as part of their non-financial statements, whether they are investing in Europe or any other part of the world. Other financial market participants will be required to disclose the alignment (or not) of their products with the taxonomy. The first company reports and investor disclosures using the EU taxonomy are due at the start of 2022.

Although the TCFD is not a regulatory standard, it is a market initiative that has gained traction as a way to show commitment with ESG investments. Canada, for example, has used it as a precondition for accessing recovery resources (“Prime Minister Announces Additional Support for Businesses to Help Save Canadian Jobs,” 2020).

The TCFD and the new sustainable European taxonomy challenge financial systems in Latin America and the Caribbean to develop regulation to gradually incentivize disclosure of climate risk by corporations and financial institutions. Compliance with the EU taxonomy can also help attract private investments from European funds or sponsors.

ALL POLITICS IS LOCAL: SUBNATIONAL GOVERNMENTS AND THE RECOVERY

One of the main challenges and opportunities for national and subnational governments is in implementing joint actions for recovery. Given the budget constraints that stimulus packages face in Latin America and the Caribbean, subnational governments, and especially cities, need the right incentives to prepare and co-finance development programs and projects. Ultimately, for climate change policies to succeed, strong political constituencies must understand how they benefit. If all politics is local, then action at the subnational level plays a critical role.

A prime concern should be to design initiatives in which cities compete for national resources on the basis of growth and employment generation in alignment with NDC's priorities. The main purpose would be to leverage more resources, including subnational debt. Some examples include projects involving sustainable transport and housing as well as energy efficiency. Adaptation projects, such as urban water drainage and flood-resilient parks, are others. Investing in nature-based solutions, which enable green infrastructure, sustainable landscape initiatives or reforestation projects, like the aforementioned case in Pakistan, as well as agroforestry projects, will also make sense in the coming years. Tertiary roads in rural areas and investments in broadband infrastructure will be needed to increase productivity and integrate poorer populations, but projects should be designed for greater adaptation to intense rain patterns or landslides.

The lack of capacity to develop and formulate sound projects in cities and rural areas, however, could be a major obstacle. For this reason, project preparation facilities are one of the most efficient uses of public resources for developing sustainable projects that both attract public finance and mobilize private sector resources. Aligning political incentives between different levels of governance is also critical for this approach to work.



CHAPTER 10

THE POLITICS OF CLIMATE: FOCUS ON THE MIDDLE CLASS

Ultimately, all politics is local. Delivering local, urban, nature-based policy solutions will also help generate awareness and experience regarding biodiversity-driven policies. The proper execution of climate change policy and its mainstreaming into the public expenditure decision-making process is conditioned upon: (i) the adoption of policy instruments that merge NDC into the policy framework and (ii) an enabling political economy supported by a strong link between politicians and their constituencies. Environmental policy in Latin America is not a cause for political divide. In fact, the region is characterized by a higher-than-average propensity to support politicians that endorse climate causes. This environmentally supportive posture may reflect the region's climate vulnerability as well as its emerging —albeit still fragile— middle classes.

A STRONG POLITICAL CONSTITUENCY: THE MIDDLE CLASS

Achieving the objectives of the Paris Agreement requires a strong electoral constituency.⁵⁴ A global survey highlighted that around the world, “middle-class respondents are more likely to consider global warming a very serious problem; and they are more likely to say that pollution is a very big problem for their country” (Kohut et al., 2009, p.21). Both from income and quality-of-life perspectives, the middle class represents an aspirational sector that in principle supports a climate transition. But middle classes are not always powerful political allies for climate policy. They also are a demanding, sometimes unstable, and often incohesive constituency. The middle class can act as a regressive force by encouraging politicians to pander to its immediate needs. Maintaining inefficient energy subsidies is a good example.

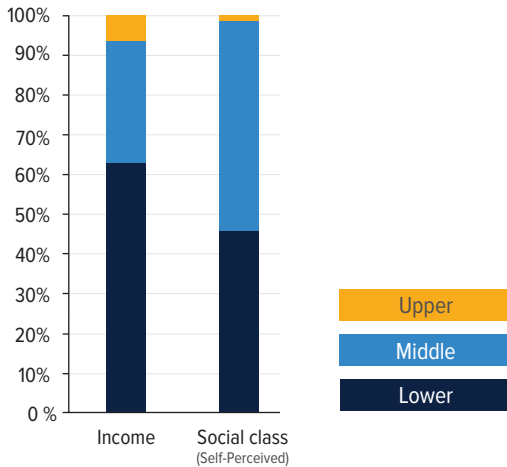
In the case of Latin America and the Caribbean, the segments of the population that self-describe as belonging to the middle class play a determinant electoral role. Understanding the linkages between climate change and middle-class aspirations then becomes a critical factor for policymakers. The climate agenda must not be viewed as a threat to a short-term improvement in living standards, but as a growth and employment engine.

Birdsall, Graham and Pettinato (2000) define the middle class as having incomes between 75% and 125% of the median income. The OECD uses the concept of middle-income class and defines it as the group of households with incomes between 75% and 200% of the median national income (OECD, 2019). Another useful and comparable approach focuses on expenditure. Cárdenas, Kharas, and Henao (2015) define the middle class as households with expenditures ranging between US\$10 and US\$100 per day in purchasing power parity (PPP) terms. Ravallion defines the developing world’s middle class as “those who are not poor when judged by the median poverty line of developing countries but are still poor by US standards” (Ravallion, 2009, p. 4). Colombia’s National Planning Department (DNP) defines the middle class both through an income-based approach and by applying the multidimensional poverty index (MPI), which looks at five dimensions: (i) household education status; (ii) childhood and youth situation; (iii) employment; (iv) health; and (v) living conditions and access to household utilities (Angulo et al., 2011). Considering all these different approaches, estimates of the middle class range from 35% to 65% of the region’s population.

However, more subjective and sociological definitions of the middle class are needed to understand the drivers of, and the obstacles to, domestic climate policy. These characteristics are particularly relevant for identifying common values and notions belonging to a middle class. Self-perception is indeed as likely, if not more likely, than actual income to determine how

54 Constituency is defined here as in Eulau and Karps (1977) and refers to a specific sociopolitical configuration with a shared interest, regardless of geography, race, gender, and income, which is achievable through legislative outcomes.

FIGURE 10.1.
Definitions of Middle Class: Income-Based versus Aspirational, Vulnerable, Self-Perceived



SOURCE: Reprinted from *La creciente pero vulnerable clase media. Patrones de expansión, valores y referencias*, by Penfold, M., and Rodríguez Guzmán, G., 2014, CAF, N° 17. CC-BY-NC.

subgroups form opinions, make decisions, and act on them, either through electoral or nonelectoral democratic processes (Hodge and Treiman, 1968; Jackman and Jackman, 1983; Lora and Fajardo, 2011).

Identifying this self-defined middle class requires other instruments, including surveys such as those conducted by Gallup, Pew, and IPSOS (in this last case only for G20 countries). According to the World Values Survey (WVS-6), 53% of Latin Americans self-identify as belonging to the middle class, in contrast to 31% using an income-based approach (Penfold and Rodríguez, 2014) (see Figure 10.1).

A crucial question is whether the subjective middle class can be considered an autonomous constituency, defined by common values and aspirations that are relevant for climate and environmental policy. Combined with the issue of trust in institutions and politicians, this has severe

consequences in terms of voting strategies and ultimately, in the strength of political mandates to act on climate policy. Indeed, low trust in political institutions affects the feasibility of reforms in many ways. Together with Vanderbilt University's Latin American Public Opinion Project, IDB researchers found that in many countries throughout the region, citizens want better services but are reluctant to fund government programs to get them (IDB-LAPOP, 2017).⁵⁵

A recent trend, which emerged around 2015 and will most likely only deepen with the social and economic consequences of the Covid-19 pandemic, is the deceleration—and in some cases reversal—of the expansion of the middle class. Thus, vulnerable groups, defined as those not in poverty but not fully belonging to the middle class (World Bank Group, 2016), will play a critical role in shaping policies. Understanding the preferences of the vulnerable, who may share middle-class aspirations but have more unstable, income-driven considerations, is essential. Moreover, dissatisfaction among vulnerable sub-groups can spread throughout the entire middle class with severe economic, social, and political consequences.

Any pronounced decline in employment and income opportunities, educational prospects, or the ability to save often results in strong social

55 The study finds, for example, that Argentines were half as likely to trust their political parties than Canadians. (Bachelet, n.d.)

dissatisfaction (Graham, 2017). This discontent is due to a defining characteristic of middle classes, which tend to prioritize economic, cultural, and social capital consolidation. In turn, strategies to maximize capital acquisition often lead to irrational, and conservative, loss-aversion type behaviors (Bourdieu, 1984). Also, contrary to what occurs in most advanced welfare state democracies, middle-income groups in emerging economies face organizational, societal, and economic challenges that prevent them from playing a positive transformative role (Wietzke and Sumner, 2014).

These challenges are compounded by the short-term bias through which constituencies generate incentives for politicians to provide short-term gratification over long-term costly measures, even if those measures are essential. In the case of climate policy, many economists frame the climate issue in these terms. By focusing on the issue of climate adaptation and responding to the already existing consequences of climate change, the objective is to demonstrate that climate can be framed in a short-term window that aligns with political incentives. The same applies to many mitigation policies; for instance, improving the quality of life at the urban level through better public transportation also results in lower GHG emissions.

MIDDLE CLASS POLICY PREFERENCES

Based on the WVS-6 results, Penfold and Rodríguez (2014) argue that the most statistically significant preferences of self-perceived middle-class belonging are access to tertiary education, an increase in income, and the capacity to grow savings. By far the most statistically significant is the ability to generate savings, which on a year-to-year basis increases the sense of middle-class belonging by 15.8%. The role of education is as pronounced as it is in Western Europe: access to higher education is a defining trait of the middle class (López Calva and Ortiz Juárez, 2011).

Success in executing any climate policy requires a thoughtful understanding of these self-perception factors. Most importantly, it requires effective communication to explain how climate policy will contribute to improving the situation of the middle class while generating short-term welfare gains for the median-voter (Downs, 1957). A comprehensive approach is also needed to address the consequences of climate shocks on household income and consumption. Regional and macro-level studies have analyzed some of these effects. But the countries in the region vary widely in terms of the availability of relevant national and subnational studies on climate shocks and differences in household income. While intergovernmental organizations (IGOs) and international financial institutions (IFIs) can often play a role in conducting and disseminating these studies, this is a pending task for

ministries of finance and planning as well as for central banks. Colombia and Jamaica, among others, offer good examples of countries with small but dedicated sustainable development and climate units within the ministries of finance to ensure full understanding of climate risks and their policy implications.⁵⁶ Recent efforts in Uruguay also confirm this trend.

Loayza, Rigolini and Llorente (2012) suggest that the expanding middle class in Latin America and the Caribbean increasingly demands policies related to education, social protection, and health. Similarly, Penfold and Rodríguez (2014) highlight the aspirations of the middle class in terms of public goods, including environmental and climate policy (Kohut et al., 2009). Recent surveys for the World Economic Forum (WEF) on the contents of post-Covid recovery stimulus packages also support green recovery, but less so when respondents are asked about specific climate conditionalities tied to such packages (IPSOS Global Advisor, 2020).

In this context, the policymaker's new north star is to formulate climate resilient policies consistent with the Paris Agreement that help consolidate the middle class by preserving its economic status and bringing more of the vulnerable into its ranks. More research is needed to identify areas where this is feasible, but better urban policy is one such policy domain where

climate policy and improved quality of life become possible. While environmental policy and post-materialistic values rank high on the lists of middle-class concerns, the question is whether a widespread, uniform constituency favors climate policy, particularly the policy options aligned with the Paris Agreement. Recent electoral outcomes and policy platforms at the urban level seem to confirm the preferences of this constituency. Throughout most metropolitan areas in Latin America and the Caribbean, green party policy platforms are being adopted by successful political candidates, including mayors. These trends are reflected in the C40 initiative: a network of the world's megacities committed to address climate change. Latin American support of the initiative and its compact of mayors reflects the political priorities for urban constituencies when choosing their elected officials (see Figure 10.2). Acting on urban policy to improve living standards becomes one

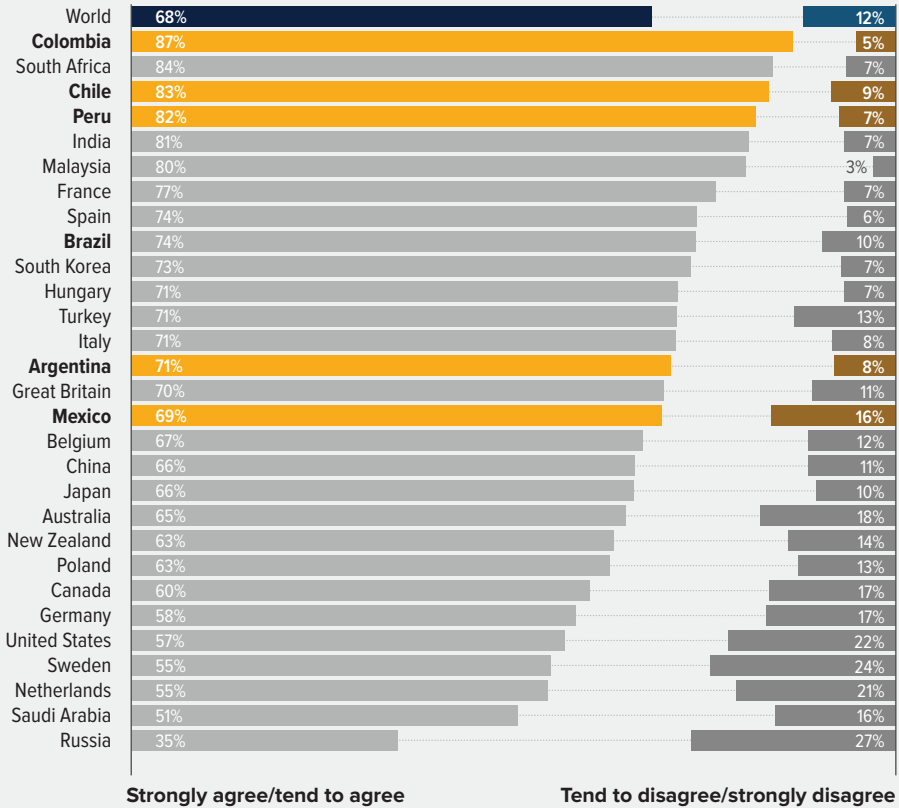
BOX 12

A New Approach for Mainstreaming Biodiversity at the Local Level

The Biodivercities program (Programa Biodiverciudades) pioneered by Colombia, which the City of Barranquilla is spearheading, offers a glimpse of possible concrete policy solutions that help address both environmental and political imperatives. Indeed, the program, which will be replicated throughout the country, aims to connect urban, peri-urban, and rural population centers that make up a regional population center while promoting natural capital and biodiversity protection with a focus on employment, economic growth, and better quality of life. Again, this requires effective urban and economic policy planning. Delivering the results of this ambitious initiative will require vertical integration between municipal, department-level, and national policymakers, as well as public and private actors. Most importantly, the planning perspective requires the involvement of those who hold the purse strings. Here again, multilateral development institutions can play a significant role in providing regional public goods to ensure the effective dissemination of knowledge and relevant practices that help advance this agenda.

56 Jamaica has a dedicated climate unit in the office of the Prime Minister of Jamaica, within the Ministry of Economic Growth and Job Creation. Colombia's Ministry of Finance and Public Credit has a dedicated climate unit.

FIGURE 10.2.
Desire for Government Action to Combat Climate Change



NOTE: Question—To what extent do you agree or disagree with the following statement: ‘If [Country]’s government does not act now to combat climate change, it will be failing the people of [Country]’

SOURCE: Reprinted from How Does the World View Climate Change and Covid-19, by IPSOS Global Advisor (2020), <https://www.ipsos.com/sites/default/files/ct/news/documents/2020-04/earth-day-2020-ipsos.pdf>

of the priorities for mainstreaming climate and biodiversity policy. Under this framework, climate and environmental outcomes must be explained to local constituencies as positive co-benefits of programs that aim to address their daily routine and short-term concerns. Here, the adoption of nature-based solutions as well as sustainable landscape management practices will prove critical in establishing capacity and helping policy makers to better understand the links between climate and biodiversity policy.

More than in other regions, according to WVS-6, the middle class in Latin America is moderate in its political views and espouses the most centrist approaches. It also stands out for embracing post-material values and aspirations, such as the environment, particularly in Argentina, Brazil, Chile, Colombia, Mexico, and Uruguay. Lack of information on the Caribbean countries—which are among the most vulnerable countries in the world—is a serious limitation.

To conclude, middle classes are in favor of climate policy solutions if sufficient education and outreach has been done. However, successful initiatives must identify and compensate those that may be negatively impacted by climate policies. This is crucial, considering the organized and concentrated groups that stand to lose from certain types of policy actions. While it may require substantial time, educational outreach needs to play a critical role when it comes to environmental policies and must highlight how the middle class is particularly vulnerable to the adverse consequences of climate change.

BOX 13

Boosting Environmentally Responsible Behavior

Compared to their Western European counterparts, the middle classes in Latin America and the Caribbean are more likely to engage in protectionist behaviors and tend to prioritize economic recovery over environmental protection. A review of available survey questions reveals an interesting trend for Colombia. When asked if climate change policy should be at the core of a government program, 87% of survey respondents answer favorably, well above the world average of 68% (Chile and Peru also rank very high: 83% and 82%, respectively). When asked how likely survey respondents are to pursue energy-saving measures such as installing insulation or make behavioral changes such as turning off the lights, only 45% respond favorably (against a global average of 50%). In general, the available survey data show that Latin American and Caribbean countries are willing to alter their behavior and take action to address some environmental challenges more than others. In the case of water conservation, for example, not only do surveyed countries respond favorably, but they are also slightly above the global average when asked if they are willing to adopt costly measures to reduce domestic water consumption. This may be the result of social awareness and education campaigns in the region which focused on water scarcity even prior to the emergence of climate policy as such.

WEATHERING THE REGION'S CHALLENGES

Countries in Latin America and the Caribbean face four simultaneous challenges. The first is social vulnerability, which is characterized by low-quality jobs, poor social protection, high degrees of informality, and pronounced income volatility. These factors put the vulnerable at risk of backsliding into poverty. In addition, the region includes 8 of the 20 most unequal countries in the world. In most countries, the wage share of income remains below the historic heights of the 1960s and 1970s (Dini and Stumpo, 2018). Beyond these most vulnerable countries, climate change is taking a toll on social vulnerability throughout the region, exacerbating it to unsustainable levels.

The second challenge is institutional: the state is largely unable to effectively respond to rising social aspirations and demands. Weakened governance is a manifestation of this challenge; so too are lack of trust and the failure to design and deliver on short-term promises that improve living standards. Latin America and the Caribbean's hyper-urban population is particularly sensitive to these issues, but policymakers cannot afford to ignore the region's rural population where poverty and these institutional challenges are even more acute.

The third challenge is low productivity, which is owing to both an export structure concentrated in the primary and extractive sectors and severe hurdles to the competitiveness of major growth engines. The consequences of climate on an insufficient and vulnerable infrastructure network affect the region's export potential considerably. The lack of investments in research and innovation that can improve the competitiveness of the agro-industrial sector while lowering its carbon footprint illustrates the danger of revenue shortfalls in the region.

Finally, and more pertinent for the purposes of this study, the environmental challenge the region faces is the need to grow economies that have thus far relied on fossil fuels and where climate change may also affect the availability of critical resources for energy generation, such as water.

In addition to these four structural challenges, the Covid pandemic and its consequences pose a serious threat to the social and economic gains of recent decades. The effects of climate change, meanwhile, will only increase in coming years. Ignoring the first while failing to act on the second threatens the successful outcome of any other agenda. While difficult to model, cascading tipping points that result from the interaction of climate shocks with biodiversity loss can affect up to 90% of GDP. Whether formulated like in Europe and the United States or not, policy responses to Covid must be driven by environmental sustainability concerns to avoid another lost decade.

Climate change is not only an environmental issue: it threatens the region's key growth factors. Some planning and finance ministries in the region understand this. Policymakers must learn to incorporate the threat of physical climate shocks into their decisions. New policy tools allow this complexity to be modeled. The IMF emphasizes this through its decision to include the evaluation of domestic climate policies under its periodic country economic assessments, also known as article IV consultations.

Successful climate action requires a two-pronged approach. From a top-down perspective, finance and planning ministries must be heavily involved and must generate their own capacity to help transform NDC into effective budget allocation and planning instruments. Climate action is about spending resources better, from inefficient subsidies to resilient, sustainable investments. Decarbonizing will add more jobs than it will destroy, but this requires compensatory mechanisms to ensure that no one is left behind. Creating capacities in ministries of finance and central banks to understand these issues is as critical as the development of capacities in public debt offices to access novel financial instruments such as green or sustainable development bonds. Given constrained fiscal space, improving the quality of public spending is not a climate-driven challenge. However, failure to consider climate will result in white elephants or unproductive investments in growth factors such as non-climate resilient infrastructure or worse: stranded assets.

A successful bottom-up approach must focus on implementation at the local level, where trust in institutions and political capital is earned for policy reforms. Urban centers and subnational governments englobe the key constituencies that suffer the effects of climate change. Low-hanging fruit that generates political capital while contributing to Paris alignment efforts exist. Policymakers must focus on discrete policy solutions that improve their daily routines through, among others, better air quality, more waste management infrastructure, and improved mass transportation. These measures alone will not suffice to meet the 2050 objective of net-zero emissions. But they will go a long way, generate economic growth, and lower, in time, the cost of other necessary reforms.

A distinct and focused approach must strive to integrate poorer, more isolated citizens. The rural-urban divide keeps widening and will manifest itself through negative land-use outcomes if left unattended. Recent global experiences highlight the risks of ignoring isolated, poorer citizens as this leads to the emergence of populist tendencies that weaken governance frameworks and render reform even more costly. Delivering on the Leticia Pact's objectives will help address some of these issues, but others will require digital and physical infrastructure investments to better integrate the disenfranchised rural poor.⁵⁷

57 The Leticia Pact is an agreement signed by seven Amazon countries to protect the rainforest.

Many of the topics touched upon in this work use comparative approaches to remedy the lack of knowledge in the region. These information gaps should not be an impediment to action. Stronger capacity to study climate within central bank research departments or macroeconomic units of finance ministries can help answer many of these issues. Among these research topics are: (i) better coherence and alignment between economic planning, budget expenditure, and the climate and SDG frameworks; (ii) more data on the exposure of assets in the region and; (iii) the role of existing roadblocks to stronger insurance mechanisms.

The international community has laid a roadmap to meet the objectives of the Paris Agreement. Emerging economies in the region may not represent the most emitting nations in the world, but they are nonetheless committed to climate action. Furthermore, they have domestic political and economic incentives to act. To achieve these objectives, new guiding policy instruments have taken shape: NDCs and LTS. If the challenge is to operationalize these as effective planning instruments, a condition for success lies in effectively mainstreaming climate considerations in all budgetary allocations as well as in channeling private funding towards sustainability-driven outcomes. Finance and planning ministry involvement and leadership is critical for this to succeed. IFIs and MDBs in particular have a critical role to play in assisting these ministries. Ongoing discussions on their capital replenishment also offer a suitable forum to better understand how institutions like the IDB can help countries in executing recovery plans that also safeguard developmental achievements for future generations.

ANNEXES

ANNEX I

ENVIRONMENTAL POLICY: A HISTORICAL PERSPECTIVE

The Birth of Modern Domestic Environmental Policy

During the 1950s, isolated, dispersed, environmental policy efforts emerged in some advanced nations. In response to London's great smog of 1952, the U.K. Parliament established the Beaver Committee, which reported in 1954 on the social and economic costs of air pollution. The committee's recommendations generated heavy financial losses for some economic actors, giving rise to the initial lobbying efforts against what would become known as climate-related policies. In 1956, the U.K. approved the Clean Air Act in response to the concern over pollution. In 1955, the United States also prepared legislation through the Air Pollution Control Act (APCA). While not a regulatory policy, the APCA helped garner enough public evidence on the human and social costs of air pollution to warrant a policy response. In 1963, federal pollution controls were enacted by signing into law the U.S. Clean Air Act.

In 1968, the U.K. Parliament approved the second Clean Air Act.⁵⁸ At the request of U.S. President Richard Nixon, the U.S. Congress prepared the National Environmental Policy Act of 1969 with the objective of establishing a Magna Carta for Environmental Policy that led to the creation of the Environmental Protection Agency (EPA) in 1970. Thus concluded a debate launched in 1967 over the need for a unified national environmental policy framework (Sauchuk, 2015).

Emergence of the International Environmental Regime

The emergence of an international environmental regime had to wait until the 1972 Stockholm Conference on the Human Environment. In 1969, the United Nations Secretary General set the foundations for a sustainable development agenda by emphasizing the need to monitor human activity and its

58 While the United Kingdom enacted consequential environmental legislation, a single cohesive policy regulatory framework did not emerge until the 1993 Clean Air Act. This delay largely reflects constitutional and legislative practice in the country rather than a lack of interest in environmental policy.

environmental consequences (U Thant, 1969). This first approach was complemented in June 1971 by the Founex seminar, which congregated international economists from around the globe to produce the first set of observations and recommendations that linked economic development and the environment (The Founex Report on Development and Environment, 1972). Most importantly, the Founex Report was instrumental in the success of the 1972 Stockholm Conference (Manulak, 2017). Indeed, the seminar and report helped identify critical policy and conceptual differences separating developed and developing nations. Peter B. Stone, a member of the conference secretariat, stated that the Founex panel's report "began life as a barely comprehensible diplomatic-economic paper, but eventually took on an aura like that of the authorized version of the Bible" (Stone, 1973, p. 102). Indeed, four intense years of negotiations foreshadowed the publication of the Founex report at the June 1972 Stockholm Conference.

Among the report's main outcomes are 26 principles concerning the environment and development and the decision to formally create the United Nations Environmental Program (UNEP). Contrary to common practice in the UN today, only two heads of state intervened in Stockholm: that of the host country and Indira Gandhi who, speaking on behalf of developing nations, reaffirmed the need and intent to reconcile economic growth, poverty alleviation, and environmental policy (Venkat, 2017). This first conference of the international environmental regime introduced one of the recurrent issues of multilateral environmental diplomacy and policy: the need to negotiate an inclusive approach among developed and developing nations.

Most of the Warsaw Pact nations did not participate in Stockholm because the German Democratic Republic was not invited. In addition, China politicized the summit over the Vietnam war (Sterling, 1972). More importantly, developing nations accepted the creation of UNEP more because it recognized the Global South by establishing its headquarters in Nairobi than because its environmental agenda and concerns were wholeheartedly embraced by the developing world. Developing countries' main driver was (and still is, to a certain extent) catching up with the most advanced economic powers (Najam, 2005).

Nevertheless, what emerged from Stockholm was an international regime focused solely on the environment that translated into policy action in certain countries. In 1973, the European Economic Community (EEC) enacted the first European environmental policy.

The Outcomes of Rio: Environmental and Climate Policy in the Region

Twenty years later, the 1992 Rio Conference had a significant impact on the formulation of environmental policy in Latin America. The Rio conference was the largest world conference at the time: 179 countries and 110 heads of government and state attended. Around 2,400 NGOs participated with

observer status, and more than 17,000 took part in a parallel NGO forum. Its massive participation reflected the evolution of the international environmental regime from a policy-driven forum to a more inclusive, deliberative series of fora that brought together various actors. Rio also set the cornerstone for the international climate change regime.

But Rio was also limiting. Not only did it fail to include the private sector, but it also fell short in addressing critical U.N. governance issues, including the structure of a clearly defined international environmental architecture. Thus, some of the same dynamics that emerged in Stockholm were de facto institutionalized in the international environmental regime and implicitly accepted for the international climate regime. The U.N. became an international forum for discussing the dilemma of achieving economic and social development while embracing what at the time was described as a costlier and inefficient developmental paradigm. While always present, this issue would not begin to be fully addressed until the Brundtland Commission in 1987 defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987).

Drawing on the case of Mexico, compliance with the international environmental regime was until recently—and to some extent still is—highly dependent on aligning the regime’s objectives with domestic policy priorities (Meirovich, 2014). This is not to say that the international regime does not influence domestic policy: the Intergovernmental Panel on Climate Change (IPCC) created in 1988 still plays a significant role. Not only does it generate international evidence-based policy recommendations, but it also strengthens capacity within countries as it informs policymakers on the state of climate science and relates it to their own geographic areas. International leadership by influential actors in regime compliance is also key, as evidenced by U.S. leadership. In the 1980s, President Reagan and then Vice-President George H.W. Bush acted on ozone depletion by overruling cabinet members and congressional opposition to act on climate change and implement the Montreal Protocol. In 1992, President George H.W. Bush signed the United States’ adherence to the U.N. Framework Convention on Climate Change (UNFCCC). The American domestic political consensus on climate policy began to wane only with the Kyoto Protocol (Wampler, 2015). An expected return to a leadership position by the Biden administration will no-doubt send a strong signal, such as the US-China good-will on climate cooperation did under the Obama years. Implementation is, however, still a domestic problem. In developing nations, the role of international concessional and grant funding, which resulted directly from the international climate regime, also played—and still plays—a significant role in enabling domestic support for the international agenda (Meirovich, 2014).

In Latin America, the emergence of comprehensive environmental policy frameworks took more than 20 years. Only during the late 1980s and early

1990s did the region begin adhering to the international regime by ratifying comprehensive frameworks that set up dedicated institutions as well as framework-type environmental legislation (Guerra Cepeda, 1998).⁵⁹ In some cases, cabinet-level environmental agencies and explicit ministerial mandates complemented adherence. Compliance with the principles of the Rio Conference and the environmental regime reflected new societal and domestic considerations that drove the emergence of environmental policymaking. While the Rio Conference certainly helped frame a regional policy window, other domestic factors—such as the consolidation of liberal democratic regimes throughout the region—also played a considerable role (Mumme and Korzetz, 1997).

By adopting advanced countries' environmental policy setting models, Latin American and Caribbean environmental policymakers fully embraced a mandate that accepted regulation but largely ignored developmental issues. This direct transposition mattered: at the international level, it resulted in negotiation gridlock. At the domestic level, it led to relatively new and weak institutions facing off against well established, powerful actors. Environmental ministries had to compete with other government agencies rather than enjoying institutional incentives to coordinate and collaborate. This competition is, to some extent, the challenge behind full implementation of Paris Agreement commitments. Fortunately, these first efforts and their shortcomings have been recognized as such by most actors in the region who have adopted or are adopting new approaches to policymaking.

The Achievements of the Paris Agreement

Unlike its predecessors, the twenty-first Conference of the Parties to the UNFCCC that took place in Paris in December 2015 (COP21) concluded with a major agreement limiting carbon emissions and providing financial support for countries to achieve their self-imposed targets. The Paris Agreement (PA) entered into force and became international law on November 4, 2016. As per the agreement, all ratifying countries are bound by its terms. While binding, the Paris Agreement's success did not rest on a typical enforcement mechanism. Rather, the success of Paris is that it shifted the negotiations from the developed versus developing nations gridlock to a more constructive positive agenda characterized by voluntary commitments that are laid out in NDCs every five years and must be increasingly ambitious in their climate control goals with each contribution (Streck et al., 2016). As of May 2020, a total of 194 nations had signed the agreement and 188 had ratified it, thereby bolstering the moral obligation to comply with the regime. While ratification is an indicator of political commitment, it also demonstrates which countries are enacting the policies needed to accomplish the objectives to which they have committed.

59 The case of Venezuela with the *Sociedad Conservacionista Aragua* stands apart and merits further consideration.

The Real Challenge: Implementation

This innovative solution highlights the dual challenge of implementing the Paris Agreement: not only must countries submit increasingly ambitious NDCs, but they must also act at the domestic level to effectively deliver on their commitments. The first dimension highlights the international weakness of the agreement: pledges under the first iteration of NDCs fall short of objectives. As of December 2019, the Climate Action Tracker reveals that if these pledges are fully implemented, the temperature of the planet would increase between 2.5°C and 2.8°C when the mandate is to limit the average increase to 2.0°C while aiming for only a 1.5°C increase. The second dimension illustrates the main challenge of the Paris Agreement: domestic implementation.

Provided countries fully implement their plans and meet their national commitments, mean temperatures will increase between 2.8°C and 3.2°C, which is well above the Paris Agreement commitment of stabilizing emissions at a level that would ensure a maximum increase of 2.0°C (UNEP, 2019a; Climate Analytics and New Climate Institute, 2020b). Furthermore, most Latin America and Caribbean countries have committed to efforts that aim to limit mean temperature increases to 1.5°C.

Addressing this limitation of the Paris Agreement is possible with increasingly ambitious climate goals but will require strong signaling from all involved parties. The case of the United States is particularly relevant. Non-participation by the United States between 2016 and 2020 casted serious doubts on the effectiveness of the Agreement. However, most signees voiced their commitment to remain a party of the Agreement. More importantly, U.S. cities and states expressed their willingness to achieve Paris Agreement objectives. Still, the international climate regime suffered in the past from nonparticipation by the United States; the Kyoto Protocol is a perfect example.

Ultimately, U.S. leadership in the international climate regime, whether direct or indirect, is undoubtedly positive, but the real challenge lies in implementing the commitments of participating nations. Since many U.S. cities and states have continued to implement Paris-aligned policy, it could be argued that the United States complies with the Paris Agreement more than other countries that submit ambitious NDCs but fail to implement them. Aside from the agreement's objective to stabilize the increase in temperature, NDC implementation can be assessed in terms of three critical policy dimensions of the Paris Agreement framework: transparency, implementation, and coherence (Pauw and Klein, 2020).

Transparency

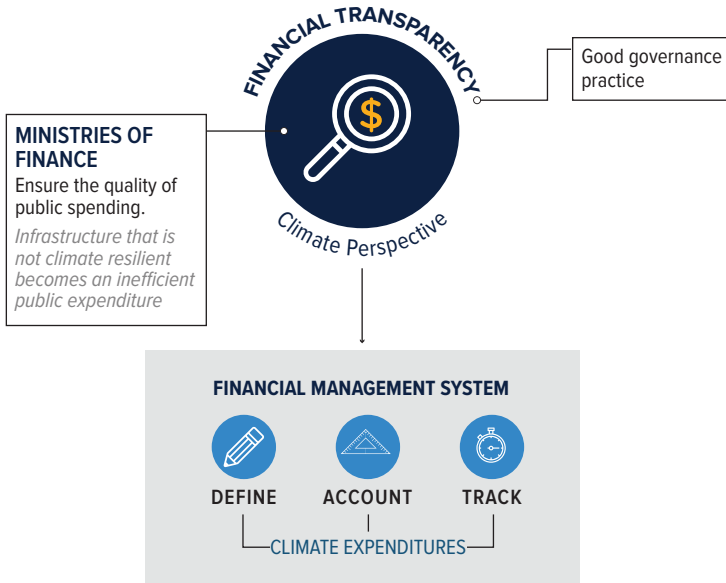
Transparency is perhaps the simplest of the three dimensions to consider. The Paris Agreement calls for total transparency in the measures and actions taken to achieve national commitments. While transparency is critical to ensure compliance given the weak enforcement mechanisms of the agreement, it is even more relevant from a good governance perspective. Transparency on emissions is critical for many reasons, including accountability but also domestic health concerns, as in the case of short-lived climate pollutants. Accountability on emissions is even more important today as civil society demands more climate action from governments.

Financial transparency on measures implemented for climate action is another angle that offers multiple advantages. The most important is that it allows finance ministries to track and evaluate the performance of public investments and how these are affected/resist to the consequences of climate change, thus improving public spending. Investing in business-as-usual infrastructure implies lower-than-expected returns on investment; infrastructure that is not climate resilient becomes an inefficient public expenditure. Climate transparency is, however, not without its challenges. Nations must develop and/or update their financial management systems to be able to define, account, and track climate expenditures. There are multiple efforts on an international scale to develop common approaches. Most importantly, for these international efforts to prosper, national tracking capacities must be developed and embedded in already existing financial systems. While environmental institutions can inform other national and subnational institutions on the reporting of emissions for a transparency framework, they cannot provide guidance for financial transparency, which is a matter for finance/economic ministries (see Figure A.1).

Implementation

Implementation presents similar challenges. In terms of the institutional arrangements that favor or hinder the achievement of Paris Agreement objectives, NDCs are de facto planning instruments whose objective is to steer productive processes towards a low-carbon economic growth path. The first iteration of NDCs was prepared quickly without the participation of relevant sectors, civil society, or the private sector. NDCs were presented in Paris largely by ministries of the environment and, sometimes, ministries of foreign affairs. Institutions such as the Ministry of Planning for Development in Bolivia, the National Planning Department in Colombia, and the Ministry of Planning in Costa Rica were not initially engaged, resulting in limited ownership of the documents, which effectively impeded implementation.

FIGURE A.1.
Financial Transparency and Budgetary Tools in Climate Policy to Improve Public Expenditure Quality



SOURCE: Data from Singh et al. (2016)

Policy coherence

The third dimension —coherence— offers a great opportunity for climate policy. Indeed, policy coherence for NDC implementation offers solutions to the previous challenges. Embedding NDCs into already existing, more solid, planning processes or in budgetary allocation exercises is the right approach. Climate policy coherence also implies that the institutional arrangements tasked with delivering Paris Agreement objectives must be flexible enough to allow countries to address the challenges of pursuing all sustainable development goals effectively and efficiently. It is important, however, to consider how many countries in the region truly embrace and implement proper policy planning frameworks.

ANNEX II

BEYOND PARIS: INTEGRATING THE CLIMATE, BIODIVERSITY, AND NATURAL DISASTER AGENDAS

Policy coherence is particularly relevant as the physical manifestations of climate change increase in frequency and intensity and cause parallel agendas to significantly overlap with implementation of NDCs. The Sendai Framework for Disaster Risk Reduction that seeks to lead international efforts on disaster risk reduction for the 2015–2030 period highlights this point. Disaster risk reduction must encompass multiple dimensions, some of which are not directly related to the consequences of climate change, such as volcanic eruptions or earthquakes. Nevertheless, as the Global Assessment Report on Disaster Risk Reduction (GAR) acknowledges, the consequences of climate change play an important role in the framework (UNDRR, 2019).

The complexity of disaster risk reduction, regardless of the type of disaster, requires truly transversal and coordinated policy responses, something that is intrinsic to the design and implementation of any effective climate policy. The need for policy coherence between these two agendas becomes self-evident when considering climate vulnerability, which is completely aligned with the definitions of risk and exposure spelled out in the Sendai Framework. This is not surprising; climate change consequences are systemic in nature and can lead to cascading disasters. Changes in weather patterns do not only have economic consequences on crop yields and rural poverty but may also aggravate nutritional deficiencies as well as migratory socioeconomic problems. In fact, the overlap between the disaster risk reduction and climate change adaptation agendas offers the opportunity (and the need) to consider complementary approaches (Mercer, 2010). UNDRR and UNFCCC both support this approach. The challenge then is to implement national policy, avoid duplication of efforts, and most importantly, maximize policy and service delivery with limited resources.

The IDB's Index of Governance and Public Policy in Disaster Risk Management (iGOPP) seeks to bolster Latin America and the Caribbean's disaster risk management capacity and governance while managing the adverse effects of climate change (Lacambra et al., 2015). This exhaustive index, which includes 241 indicators, identifies the fundamental legal, institutional, and budgetary conditions for effective implementation of Disaster Risk Management in a particular country. Building on the premise that only measurable and understood adverse effects can be mitigated through effective planning, the iGOPP is conceived as a policy-guiding instrument to effectively generate needed institutional capacities. Application of the iGOPP in more than 11 Latin American and Caribbean countries reveals incipient progress

and highlights opportunities for policy coherence and stronger institutional mandates. If the climate adaptation policy and disaster risk reduction agendas clearly overlap, it may be possible for a disaster risk-driven agenda to also focus on the longer-term challenges and full spectrum of interventions needed for developing adaptive capacity.

Two other important agendas that significantly overlap and could be joined are the ocean and biodiversity agendas. In fact, the 25th Conference of the Parties of the UNFCCC that met in Madrid in December 2019 highlighted these overlaps and the need to further drive the agendas together.

In the case of oceans, COP25 was dubbed by the organizers (Chile) as the “blue COP.” Beyond the natural links between the Earth’s bodies of water, the water cycle, and an evolving climate, it is critical to understand that oceans and coasts are major drivers of the global economy, generating approximately US\$2.5 trillion per year in services and ocean/coast products (Hoegh-Guldberg, 2015). This is even more relevant in Latin America and the Caribbean where a significant percentage of the population resides in coastal zones (see Chapter 2). More importantly, oceans act as the Earth’s largest heat and carbon sinks. The ocean has absorbed 93% of the heat generated by industrial CO₂ emissions and it captures nearly 30% of the CO₂ released into the atmosphere every year (Gattuso et al., 2015). Innovative approaches such as Chile’s policy for developing carbon-capturing Maritime Protected Areas can also protect and generate fishery and conservation-related employment. If these options become even more relevant and suitable business models can be developed, the complementarity between the agendas will become more apparent.

The consequences of climate change on the environment are not only directly detrimental to human activity. By affecting our ecosystems and their biodiversity, climate change compounds the social and economic consequences of environmental deregulation. In fact, climate change may become the principal driver of biodiversity loss in the future. As the Dasgupta Review (Dasgupta, 2020) points out, science is establishing clear connections between the biodiversity and climate research agendas, although much remains to be identified and fully understood from a policy perspective. This is, nevertheless, an opportunity that must be fully embraced by most countries in Latin America and the Caribbean.

Indeed, as ministries of finance and economics and other sectoral ministries gain knowledge from their environmental counterparts and begin to incorporate climate agendas in their respective mandates, policy coherence can help (i) avoid competition for resources; (ii) leverage interventions and mandates; and (iii) avoid a repeat of mistakes in which a failure to consider all aspects of a new comprehensive environmental framework leads to national gridlock in implementation. Effective engagement with ministers of economics and planning thus implies translating these concepts into policy issues that are in line with the corresponding mandates. The same applies to all sectors that must also be involved in order to effectively mainstream these issues.

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