

TECHNICAL NOTE N° IDB-TN-2963

Climate Action in Latin America and the Caribbean

Fiscal Policies and the Indispensable Role of Finance Ministries

Prepared for the Inter-American Development Bank by:

Mauricio Cárdenas
Camilo Peña

Inter-American Development Bank
Fiscal Management Division
Institutions for Development Sector

July 2024



Climate Action in Latin America and the Caribbean

Fiscal Policies and the Indispensable Role of Finance Ministries

Prepared for the Inter-American Development Bank by:

Mauricio Cárdenas*

Camilo Peña*

*School of International and Public Affairs, Columbia University

Inter-American Development Bank
Fiscal Management Division
Institutions for Development Sector

July 2024



**Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library**

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

Climate action in Latin America and the Caribbean: fiscal policies and the indispensable role of finance ministries / Mauricio Cárdenas, Camilo Peña.

p. cm. — (IDB Technical Note ; 2963)

Includes bibliographical 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. Fiscal policy-Latin America. 8. Fiscal policy-Caribbean Area. I. Peña, Camilo.

II. Inter-American Development Bank. Fiscal Management Division. III. Title. IV. Series.

IDB-TN-2963

JEL Codes: Q54, Q56, H23, H87, O23, O44, O53, O57

Keywords: mitigation, adaptation, climate change, fiscal policy, green fiscal frameworks, investment strategies, finance ministries, sustainable development, economic vulnerability, infrastructure investment, policy instruments, public spending, private sector involvement, regulatory frameworks, fiscal space, debt sustainability, insurance, green taxonomy, green budgeting, green tagging, fossil fuels, renewable energy, carbon pricing, renewable energy transition

<http://www.iadb.org>

Copyright © 2024 Inter-American Development Bank ("IDB"). This work is subject to a Creative Commons license CC BY 3.0 IGO (<https://creativecommons.org/licenses/by/3.0/igo/legalcode>). The terms and conditions indicated in the URL link must be met and the respective recognition must be granted to the IDB.

Further to section 8 of the above license, any mediation relating to disputes arising under such license shall be conducted in accordance with the WIPO Mediation Rules. Any dispute related to the use of the works of the IDB that cannot be settled amicably shall be submitted to arbitration pursuant to the United Nations Commission on International Trade Law (UNCITRAL) rules. The use of the IDB's name for any purpose other than for attribution and the use of IDB's logo shall be subject to a separate written license agreement between the IDB and the user and is not authorized as part of this license.

Note that the URL link includes terms and conditions that are an integral part of this license.

The opinions expressed in this work are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent.



Abstract*

Countries in the Latin American and Caribbean (LAC) region face escalating challenges from climate change due to geographic location, economic reliance on climate-sensitive sectors, and increasing frequency, intensity, and duration of extreme weather events. Despite international commitments and efforts from LAC countries, current mitigation and adaptation investments are insufficient to avert significant climate impacts. Estimations of financial needs vary significantly depending on the source, ranging between US\$228 billion and US\$513 billion per year for mitigation, while annual adaptation flows range from US\$65 billion to US\$250 billion. As in other regions of the world, LAC countries have prioritized mitigation over adaptation. To achieve a more balanced approach the region requires a change in fiscal policies. Exploring fiscal space for increased investments in climate in the context of severe post-pandemic social needs and the need to prevent and prepare for future pandemics is challenging. It is imperative for finance ministries to decisively engage by changing the composition of public investment while leveraging private sector engagement. The use of green budgeting methodologies, regulation, public debt strategies, and state-owned enterprises for this purpose is crucial. This report offers a diverse array of tools and policies for finance ministries to bolster climate action across three core pillars: (i) developing climate strategies for nations, (ii) creating the right incentives to mobilize climate financing, and (iii) ensuring fiscal management consistent with climate goals.

* Mauricio Cárdenas is a professor of professional practice and Camilo Peña is an MPA student, both at the School of International and Public Affairs, Columbia University. We would like to thank the Inter-American Development Bank for supporting this research project and Alejandro Rasteletti, Philip Keefer, and Carola Pessino for very helpful comments and suggestions.

Contents

1. Introduction.....	4
2. Assessing the Climate Investment Gap in Latin America and the Caribbean	7
2.1. Cost of Climate Inaction: Unmitigated Climate Risks	9
2.2. Insufficient Levels of Climate Change Investments.....	13
3. Assessing the Scale of Investment for Mitigation and Adaptation in Latin America and the Caribbean	17
3.1. Investments Required for Mitigation	17
3.2. Investments Required for Adaptation	21
3.3. Summary of Required Climate Change Investments in LAC	23
3.4. Mitigation and Adaptation: Complementarities and Tensions	25
3.5. Do Countries in LAC Have Fiscal Space to Increase Investments in Climate Change?	27
3.6. Developing the Investment Ecosystem in LAC	29
4. Policy Instruments for Mitigation and Adaptation: An Overview of the FM Toolbox	32
4.1. Developing Climate Strategies for Nations: Ensuring Fiscal Viability in Plans...	33
4.1.1. Role in National Climate Change Strategies	33
4.2. Creating the Right Incentives to Mobilize Climate Financing	34
4.2.1. Influence on the Design of Regulation	35
4.2.2. Removing Fossil Fuel Subsidies	38
4.2.3. Renewable Energy Subsidies.....	40
4.2.4. Public Financing: Use of Thematic Bonds	41
4.2.5. Green Taxonomies.....	46
4.2.6. Insurance.....	48
4.2.7. Environmental Tax Reforms.....	50
4.3. Ensuring Fiscal Management Consistent with Climate Goals	54
4.3.1. Green Budgeting, Green Tagging, and Green Procurement	55

4.3.2.	Analytical Frameworks and Capabilities	58
4.3.3.	State-Owned Enterprises	60
5.	Assessing Climate Action in Latin America and the Caribbean: Implementation Status and Challenges.....	63
5.1.	Progress and Challenges in Green Fiscal Policies across LAC	63
5.2.	Implemented Policies and Measures across LAC's Six Largest Economies.....	67
5.3.	A Roadmap for Action.....	70
6.	Conclusion and Recommendations	73
	References	76
	Appendix A. Mitigation and Adaptation: Complementarities and Tensions.....	91
	Appendix B. Green Fiscal Policy Maturity Assessment for the Six Largest Economies in Latin America and the Caribbean.....	98
1.	Brazil	100
2.	Mexico	102
3.	Argentina	105
4.	Colombia.....	107
5.	Chile.....	109
6.	Peru	111

1. Introduction

In the face of climate change's ever-increasing impacts, Latin America and the Caribbean (LAC) is at a critical juncture. Current international commitments, including unconditional and conditional nationally determined contributions (NDCs), are unlikely to avert a significant rise in global average temperatures. The resulting warmer planet will unleash diverse challenges for LAC such as more frequent extreme weather events, the erosion of biodiversity, and significant economic and social repercussions.

LAC's vulnerability to climate change is exacerbated by its geographic location and economic reliance on climate-sensitive sectors. Of the 25 nations in the world most vulnerable to climate risks, 10 of them are in LAC (Eckstein, Künzel, and Schäfer, 2021). Without increased investment in mitigation and adaptation measures, the consequences of climate inaction in the region could be severe. Already, annual climate-related damages have reached US\$11 billion and are forecasted to surge to US\$100 billion by 2050, as highlighted by the Inter-American Development Bank (IDB) (Jiménez and Visconti, 2023). The World Bank warns of a 3.3 percent decline in GDP by 2030, attributed to climate-induced ecosystem collapse (Ruta et al., 2021). Moreover, extreme climate events cause fiscal strain, with each occurrence resulting in a 0.8 percent to 0.9 percent GDP increase in fiscal expenditures, further compounded by reduced tax revenues (Delgado, Eguino, and Lopes, 2021).

While countries across LAC have initiated climate action efforts, they currently fall short of meeting the escalating demands posed by climate change. Investments in climate mitigation and adaptation in LAC during 2019–2020 were just 5.5 percent of the world's total, far from commensurate with the region's needs (Climate Policy Initiative, 2021). The region's relatively low investment can be attributed to several factors including restricted access to climate finance, a sluggish adoption of climate and energy transition policies, inadequate regulatory frameworks and incentives, and competing funding priorities such as the burgeoning requirements for social spending and infrastructure development.

Estimates of average annual climate-related financial needs in the region, including the costs of mitigation and adaptation, vary significantly from US\$21 billion (UNEP's annual cost for adaptation by 2030 for LAC [UNEP, 2022a]) to US\$885 billion (estimated by the IDB in achieving climate goals in LAC [Galindo, Hoffman, and Vogt-

Schilb, 2022]). This substantial variation results from different scopes and methodologies including varying sector coverage, emissions reduction scenarios, and assumptions about carbon prices. Adaptation estimates are only beginning to be included but lack comprehensive quantification in NDCs and related documents, highlighting the urgent need to address estimation gaps to formulate effective financing strategies.

Adding to the complexity, rising temperatures and extreme climate events have prompted a contentious debate in the region on whether mitigation efforts should be prioritized despite the relatively low emissions or if the focus should be on urgent adaptation measures to face imminent climate impacts. Finance ministries (FMs) need to confront this dilemma and deal with complex decision-making. Addressing conflicts between mitigation and adaptation efforts is essential for achieving a balanced approach to climate policies and requires coordinated collaboration among stakeholders alongside the implementation of comprehensive fiscal policies to ensure complementarity and catalyze private investment. The region needs a holistic approach that harmonizes adaptation and mitigation strategies to effectively address climate change and alleviate tensions while ensuring a just transition to a low-carbon economy.

Amidst the escalating challenges posed by climate change, FMs will play a critical role in managing public spending, mobilizing resources for climate action, and coordinating inter-institutional efforts for mitigation and adaptation projects. However, challenges persist in implementing comprehensive green fiscal frameworks, as countries struggle to develop long-term plans, policies, incentives, and financing strategies for their climate commitments. This highlights the need for improved coordination and sustainable finance reforms. This document emphasizes the pivotal role that FMs must undertake in coordinating economic strategies and fiscal policies to bolster climate action. In addition to utilizing tax and expenditure policies, FMs should leverage their regulatory powers to drive investment towards climate initiatives. Such comprehensive engagement has the potential to catalyze broader co-benefits such as macroeconomic stability, economic growth, job creation, and responsible public finance management.

This report serves as a guide, offering a spectrum of tools, policies, and models that FMs can employ to increase climate action across the region. The report is structured as follows: Chapter 2 sets the scene by assessing how vulnerable LAC is to climate change, identifying possible economic and fiscal costs and impacts of climate

inaction and offering an overview on the insufficient levels of climate change investments in the region. Chapter 3 explores the required investments for both mitigation and adaptation, examining the tensions between the two and offering a framework to assist FMs in jointly addressing the resulting trade-offs. Chapter 4 presents the range of tools available to FMs to strengthen climate investment in LAC. Chapter 5 assesses the adoption of some of those instruments in LAC, with a particular focus on the six largest economies in the region and a general roadmap for implementation. Finally, Chapter 6 presents the main conclusions and recommendations.

2. Assessing the Climate Investment Gap in Latin America and the Caribbean

Today, a significant share of the global population is already experiencing temperature increases exceeding 1.5°C in certain seasons. The Intergovernmental Panel on Climate Change (IPCC, 2022c, 8) has warned that "there is at least a greater than 50 percent likelihood that global warming will reach or exceed 1.5°C in the near-term, even for the very low greenhouse gas emissions scenarios.". The planet's temperature has already increased by 1.1°C on average above preindustrial levels (1850–1900), and current temperatures are higher than any recorded in the past 100,000 years (IPCC, 2022a). Substantial warming has already occurred in many parts of the world, including Latin America. About 20–40 percent of the global population has experienced a temperature rise of more than 1.5°C during at least one season.

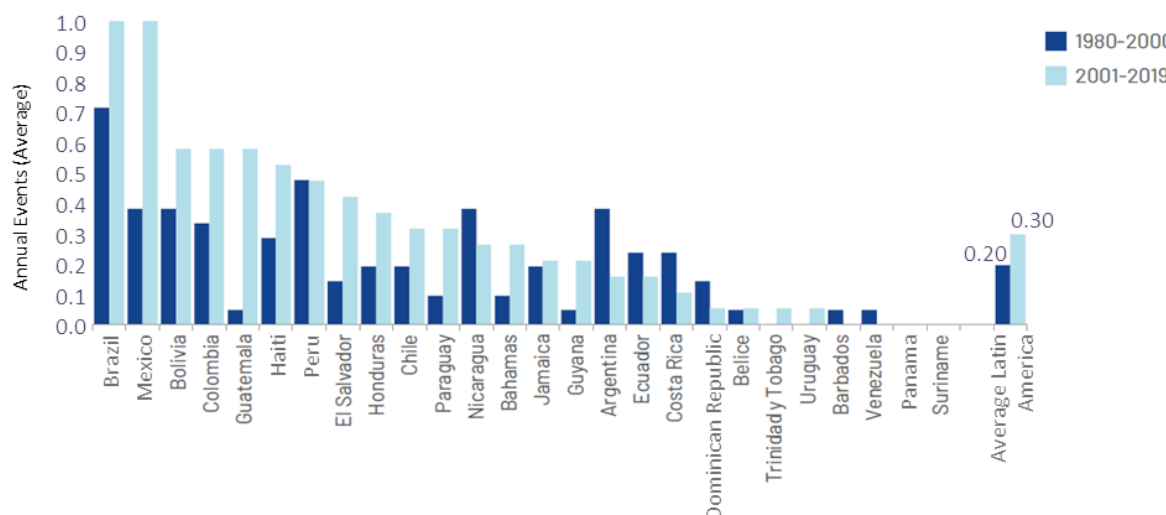
Rising global temperatures are fueling a surge in extreme weather events' duration, frequency, and intensity, resulting in significant economic losses and escalating costs for infrastructure reconstruction.¹ The already higher temperatures directly correlate with the increasing extreme weather events. According to Munich Re (n.d.), the number of extreme weather events with economic losses almost doubled between 1998 and 2018. As these events continue to increase, so will the costs of loss, damage, and rebuilding infrastructure, reaching US\$270 billion in 2022 (Munich Re, n.d.). Importantly, some of these risks will soon become uninsurable.

The Latin America and the Caribbean (LAC) region is one of the most vulnerable to the impacts of climate change. Extreme weather events—including frequent and severe droughts, floods, and heat waves—will intensify in the future, posing significant challenges to the region's economy, environment, and population. Compounded by the region's high poverty and inequality levels, as well as its heavy economic dependence on natural resources, LAC faces heightened vulnerability to the physical risks associated with climate change. The region is experiencing an increase in extreme weather events. In fact, 10 LAC countries are among the 25 worldwide that are most vulnerable to climate risks (Eckstein, Künzel, and Schäfer, 2021). Figure 1 illustrates the increase in the average annual frequency of extreme weather events in each country within the region, which

¹ "Weather" refers to short-term atmospheric conditions including temperature, humidity, wind, and precipitation. "Climate" refers to the long-term average of these conditions, typically over a period of 30 years or more (Goessling, 2023).

rose from 0.20 occurrences per year during 1980–2000 to 0.30 occurrences per year between 2001 and 2019 (Delgado, Eguino, and Lopes, 2021). The Bahamas, El Salvador, Guatemala, Guyana, Mexico, and Paraguay have experienced the most significant increases.

Figure 1. Frequency of Extreme Climate Events in LAC (1980–2019)



Source: Delgado, Eguino, and Lopes (2021).

The LAC region exhibits a pronounced vulnerability to climate change. According to the World Meteorological Organization (WMO, 2023), climate change impacts on LAC countries have exceeded the global average. Moreover, prolonged and severe droughts, along with the increased frequency of extreme precipitation events and hurricanes, further accentuate the region's exposure to climate-related challenges.

High levels of poverty and inequality make the region more vulnerable to climate change. Climate change is expected to exacerbate and intensify food insecurity and water scarcity and contribute to population displacement. Vulnerability, as defined by the World Bank (2021) and Dale (2022), includes limited adaptive capacity to cope with existing climate variability and future change, falling into (or exacerbating) poverty and causing a decline in living standards. According to ECLAC (2022), 201 million Latin Americans (32.1 percent of the region's population) live in poverty (82 million or 13.1 percent of the total population lives in extreme poverty). Poverty and human displacement in LAC are likely to increase as a result of climate change.

2.1. Cost of Climate Inaction: Unmitigated Climate Risks

The costs of climate inaction are too significant to ignore, prompting finance ministries (FMs) to prioritize increased financing for climate change initiatives. Recent geopolitical events, the COVID-19 pandemic, inflation, among others have raised concerns for FMs to concentrate their efforts in addressing economic growth and social unrest. Nonetheless, the economic and social costs of climate inaction, including the loss of lives and health, damage to infrastructure, and disruption of essential services, can be substantial and far-reaching. As temperature increases, the Global South will face the harshest impacts. According to the IMF (2017), countries with average temperatures below 13–15°C would benefit from higher temperatures in terms of economic activity, whereas nations with temperatures above this range would face economic challenges and reduced per capita output in both the short and medium term. Emerging markets and developing economies (EMDEs) in the Global South will face the most severe impacts due to climate change; an increase of just 1°C will have negative consequences in almost all LAC countries (IMF, 2017).²

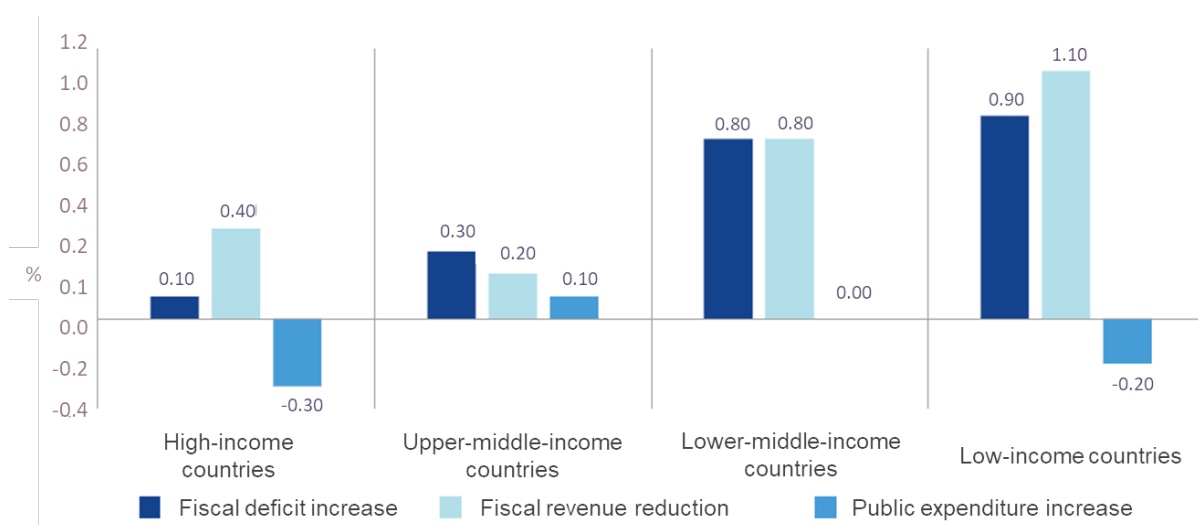
Estimating future economic losses due to climate change is challenging because of uncertain climate scenarios, complex interactions between climate impacts, and the non-linear nature of some consequences. Nonetheless, current estimations of these losses are shocking. The IPCC (2022b) estimates that developing countries may face an average aggregate GDP reduction of 9 percent by 2100 due to climate change impacts. Although impacts extend beyond changes in average temperature, every additional 1°C temperature increase relates to an approximate decline of 1 percent to 4 percent in GDP (Tol, 2022). According to the Global Climate Risk Index, the total annual climate-related damage in LAC amounts to approximately US\$11 billion (Eckstein, Künzel, and Schäfer, 2021). The Inter-American Development Bank (IDB) highlights that LAC could face an annual cost of US\$100 billion by 2050 due to the impacts of climate change (Jiménez and Visconti, 2023). The World Bank projects that by 2030, LAC could face a 3.3 percent decrease in GDP due to economic losses resulting from the collapse of natural ecosystems caused by climate change and inadequate efforts to protect and restore

² In an average emerging market economy with a temperature of 22°C, a 1°C temperature rise results in an immediate 0.9 percentage point drop in per capita GDP. Conversely, in a typical low-income developing country with a temperature of 25°C, a 1°C temperature increase leads to a more significant decline of 1.2 percentage points in per capita GDP (IMF, 2017).

nature (Ruta et al., 2021). Climate change in the Caribbean region alone accounts for US\$14 billion in annual losses, representing 1.8 percent of its GDP (World Bank, 2022b). Moreover, Tol's (2022) meta-analysis on the economic consequences of climate change concluded that global warming consistently yields negative economic impacts, so that “global warming of 2.5°C would make the average person feel as if she had lost 1.7 percent of her income” (Tol, 2022, 5).

Fiscal impacts in LAC due to extreme climate events and climate change risks can be considerable. The occurrence of at least one extreme weather event per year is linked to an increase in the fiscal deficit of 0.8 percent of GDP for lower-middle-income countries and 0.9 percent of GDP for low-income countries in the same year, as seen in Figure 2 (Delgado, Eguino, and Lopes, 2021). A significant portion of this fiscal deficit stems from a reduction in tax revenues, accounting for 0.8 percent of GDP in lower-middle-income countries and 1.1 percent in low-income countries (Delgado, Eguino, and Lopes, 2021). The influence on contemporary public expenditure remains limited, with low-income countries even witnessing a reduction in spending, which might be attributable to restrictions on debt financing when a shock occurs. The frequency of extreme climate events in the region from 2001 to 2019 resulted in negative fiscal impacts between 0.2 percent and 0.3 percent of GDP annually (Delgado, Eguino, and Lopes, 2021); in the region, the average fiscal deficit was 2.6 percent of GDP.

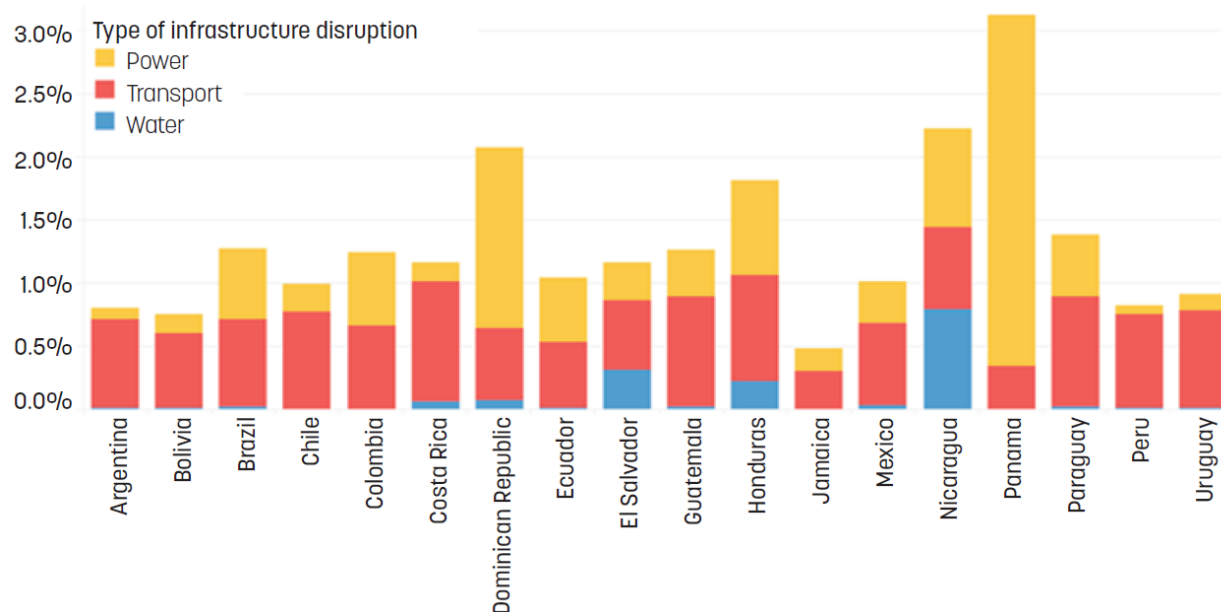
Figure 2. Fiscal Impact of Extreme Weather Events across Income Groups in LAC



Source: Delgado, Eguino, and Lopes (2021).

Climate change shocks are causing substantial economic losses in infrastructure. Disruption of infrastructure, especially in power and transportation networks, leads to economic costs exceeding 1 percent of GDP on average throughout LAC (Figure 3), reaching up to 2 percent of GDP annually in certain Central American nations (World Bank, 2021). On average, across LAC, around 56 percent of business losses following climate shocks can be attributed to disruptions in transportation (World Bank, 2021). Investments to improve infrastructure resilience could decrease annual losses: every dollar invested generates US\$12 in savings (World Bank, 2021). Additionally, losses from physical climate risk in developing and oil-exporting countries could range between 3.2 percent and 5.7 percent of GDP by 2050 (Roshen, Liu, and McKibbin, 2021).

Figure 3. Cost of Infrastructure Disruption in LAC Countries (in percentage of GDP)



Source: World Bank (2021).

Without significant efforts to mitigate climate change, over 17 million people in LAC could be forced to relocate by 2050 (World Bank, 2021). This could significantly increase cities' urban migration and population growth by up to 10 percent. According to the World Cities Report (UN-Habitat, 2020), 26 percent of the population in LAC lives in inadequate housing or informal settlements, and this number could have increased during the COVID-19 pandemic. Precarious living conditions expose people to a considerable risk of housing displacement and insecurity.

Climate change impacts will disproportionately burden vulnerable populations, potentially driving 5.8 million people into extreme poverty in LAC by 2030. Hallegatte and Rozenberg (2017), who developed a methodological approach and a model to assess the impacts of climate change on poverty, concluded in their optimistic poverty scenario that 35 million people worldwide could be induced into extreme poverty. According to the IPCC (2022b), by 2030 at least 5.8 million people in LAC will be pushed into extreme poverty, while the World Bank (2021, 1) notes that “climate shocks reduce the income of the poorest 40 percent by more than double the average of the LAC population.”

Water is highly susceptible to the impacts of climate change. Changing precipitation patterns and rising temperatures could alter the availability and distribution of water resources, affecting both water supply and demand.³ This could lead to increased water scarcity, reduced water quality, and potential disruptions to water-dependent sectors such as agriculture, energy, and industry. Water scarcity and droughts alone have caused economic damage of US\$24 billion in LAC over the past 40 years (World Bank, 2022b). Additionally, losses attributed to droughts in the Central American Dry Corridor, spanning from Panama to southern Mexico, have reached around US\$10 billion over the past three decades, with half of these losses affecting the agricultural sector (World Bank, 2021).

Climate change and water challenges in LAC can exacerbate the spread of diseases through various channels, increasing economic losses for the region. Rising temperatures and changing climatic conditions can create conditions for the breeding and propagation of disease-carrying vectors, leading to increased transmission of vector-borne and water-borne diseases such as dengue, Zika, diarrhea, and malaria (World Bank, 2022b).⁴ These health issues can strain healthcare systems while also reducing productivity and hindering economic growth. Climate change will worsen health threats, especially in LAC, where rising temperatures will increase heat waves, risking lives and potentially raising rates of miscarriage and heat-related deaths.

³ In Latin America, approximately 166 million individuals lack access to properly managed water supply services, while 24 million people lack even basic services (World Bank, 2022b).

⁴ Malaria is responsible for more than 600,000 deaths worldwide and climate change is likely to increase this number as the disease will spread to new altitudes and regions (Gowen, Kommenda, and Bashir, 2023).

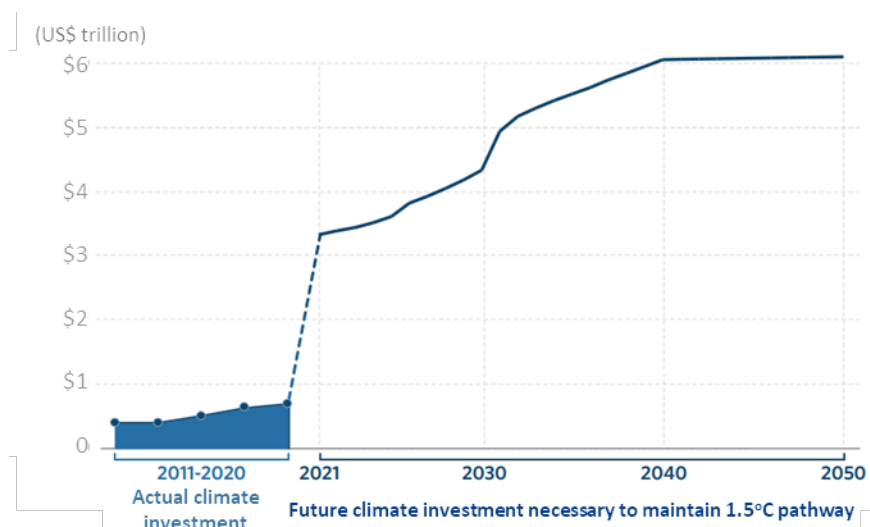
Rising ocean temperatures, changes in precipitation patterns, floods, and droughts will impact LAC agriculture, forestry, and fisheries sectors, affecting crop diversity and food security. According to the World Bank (2023a), by 2021 these sectors represented approximately 6.5 percent of LAC's GDP. Changing climate patterns such as higher temperatures and decreased annual precipitation have adverse effects on crop and food security, leading to reductions in crop yields, disruptions in planting and harvesting seasons, and increased susceptibility to pests and diseases (Lachaud, Bravo-Ureta, and Ludena, 2022). Total factor productivity (TFP) in the agricultural sector from 1961 to 2015 was 21 percent lower compared to previous decades due to climate change impacts (Ortiz-Bobea et al., 2021).⁵ Lachaud, Bravo-Ureta, and Ludena (2022) have estimated that climate change will reduce average annual TFP in LAC's agricultural sector between 9.0 and 12.7 percent over the 2015–2050 period. In a conservative estimation, the expected economic cost for the LAC region ranges from US\$8.3 to US\$20.1 billion per year, excluding extreme weather impacts and damage to agricultural infrastructure (Lachaud, Bravo-Ureta, and Ludena, 2022) that will further exacerbate food insecurity.

2.2. Insufficient Levels of Climate Change Investments

While global investments addressing climate change have increased considerably, they have nevertheless fallen short of fully aligning with the world's climate and socioeconomic development objectives. Figure 4 displays the annual climate investments needed according to the Climate Policy Initiative (2021). Conservative scenarios estimate climate finance needs at US\$4–5 trillion. However, actual investments are already reaching nearly US\$1 trillion.

⁵ TFP is defined as the “ratio of all agricultural outputs to all agricultural inputs” (IPCC, 2022b, 728).

Figure 4. Current and Required Climate Investments, 2011-2050



Source: Climate Policy Initiative (2021).

Climate investment in LAC during 2019–2020 was only US\$35 billion, or 5.5 percent of the global total, piling in comparison to East Asia and the Pacific’s US\$292 billion (46.2 percent of the total), and Western Europe’s investment was US\$105 billion (16.6 percent) (Climate Policy Initiative, 2021). In LAC, US\$16 billion (46 percent) was funded by domestic sources, while US\$19 billion (54 percent) originated from international sources. In addition, the allocation of multilateral climate funds in LAC remains concentrated in the largest economies and directed to mitigation initiatives, highlighting the need for greater diversification and prioritization of adaptation projects.

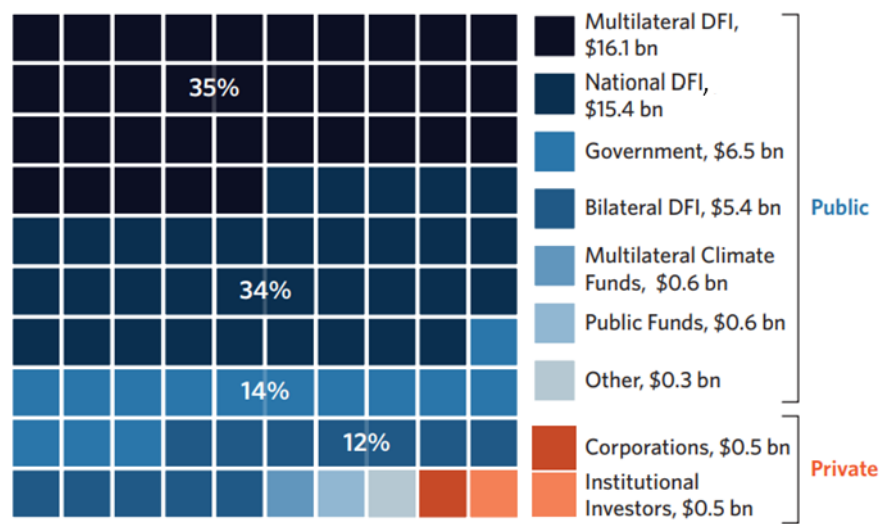
Global energy transition investments reached a new record high of US\$1.3 trillion in 2022; nonetheless, the current level of investments is still insufficient. Investments need to at least quadruple to prevent irreversible climate impacts and achieve the 1.5°C global temperature increase scenario (IRENA, 2023). LAC only represented 4 percent of global renewable energy investments in 2022 (IRENA, 2023).

As global temperatures and the frequency of extreme weather events increase, the need for greater investment in adaptation becomes more urgent given the widening finance gap in this area. Despite the critical climate events reported worldwide, only 7.3 percent (US\$46 billion) of all climate investment in 2020 was directed to adaptation projects; 90.3 percent (US\$571 billion) was invested in mitigation, and 2.4 percent (US\$15 billion) in dual uses (Climate Policy Initiative, 2021). The

Adaptation Gap Report (UNEP, 2022a) estimates the annual adaptation costs in developing economies could range from US\$160 billion to US\$340 billion annually by 2030 and increase to US\$315 billion to US\$565 billion annually by 2050.

Development banks are leading investments in adaptation. In fact, 98.7 percent of adaptation investment comes from public and multilateral actors. National and multilateral development banks (MDBs) represent 68.5 percent of adaptation finance flows, while only 14 percent comes from governments (Figure 5). Investments from private sector sources represented a modest 2.2 percent, although these flows are difficult to track (Climate Policy Initiative, 2021).⁶

Figure 5. Sources of Adaptation Finance, 2020



Source: Climate Policy Initiative (2021).
 Note: "DFI" refers to development finance institutions. Amounts are in US\$.

Public sector spending plays a pivotal role in incentivizing private sector investment. Significantly, there appears to be a strong correlation between government expenditure and private sector investment incentives. When government spending is limited, it follows that incentives for private sector spending are also diminished. This association

⁶ Private sector adaptation investments are low because (i) adaptation-related activities are often embedded in projects that are not purely related to adaptation, (ii) data on within-country private sector and public sector investment is often missing, (iii) clear-cut government policies are lacking and there are inadequate incentives for private sector-led investments in climate change adaptation, and (iv) market and policy failures may also limit private adaptation or create distortions (Aligishiev, Bellon, and Massetti, 2022). It is possible that where government spending is low so are incentives for private sector spending. In this case, the unmeasured private sector investment is likely to be much larger in countries that have a large public effort.

implies that in countries where substantial public efforts are made to address climate change, private sector investment is likely to be notably higher. This observation underscores the impact that robust public policies, incentives, and strategies can have on encouraging private investment in climate-friendly endeavors.

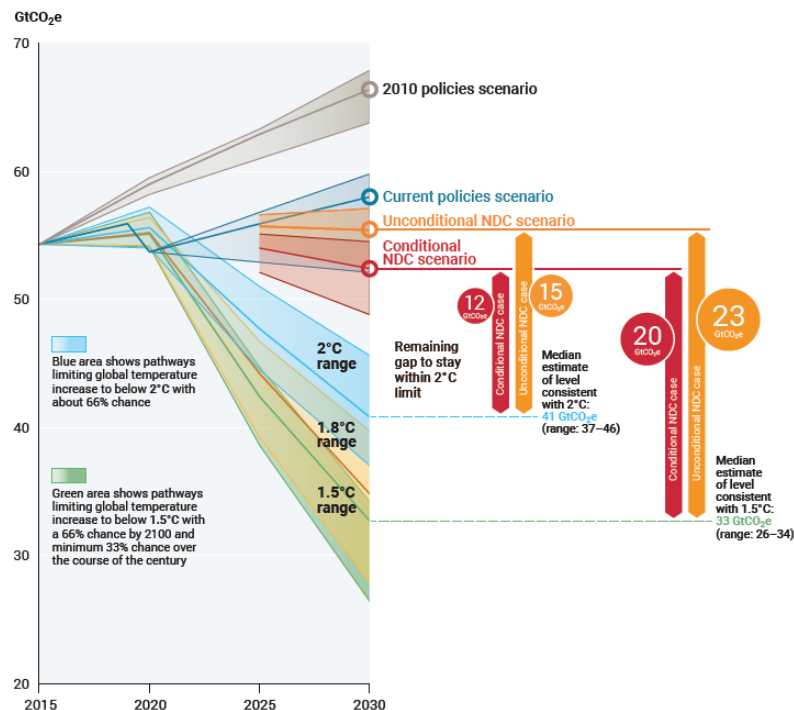
3. Assessing the Scale of Investment for Mitigation and Adaptation in Latin America and the Caribbean

Despite efforts stated in current NDCs, projections indicate an insufficient reduction in global temperature rise. This chapter underscores the significant financial gaps in achieving climate goals and compares various estimates regarding the required investments associated with mitigation and adaptation efforts in the region. While recognizing the increasing demand for adaptation projects, the chapter also discusses the challenges in mobilizing private sector investments for such initiatives. Moreover, it explores the interplay between mitigation and adaptation efforts, recognizing both their complementarities and potential tensions.

3.1. Investments Required for Mitigation

Even with full implementation, the current unconditional and conditional nationally determined contributions (NDCs) are projected to fall short of averting a substantial global average temperature rise that is estimated to range between 2.4°C and 2.6°C. There are considerable gaps in greenhouse gas (GHG) emissions targets to achieve desirable climate goals (Figure 6). Countries are expected to increase the ambition of their NDCs, and additional resources will be urgently required to reduce emissions further.

Figure 6. Global GHG Emissions under Different Scenarios and the Emissions Gap in 2030



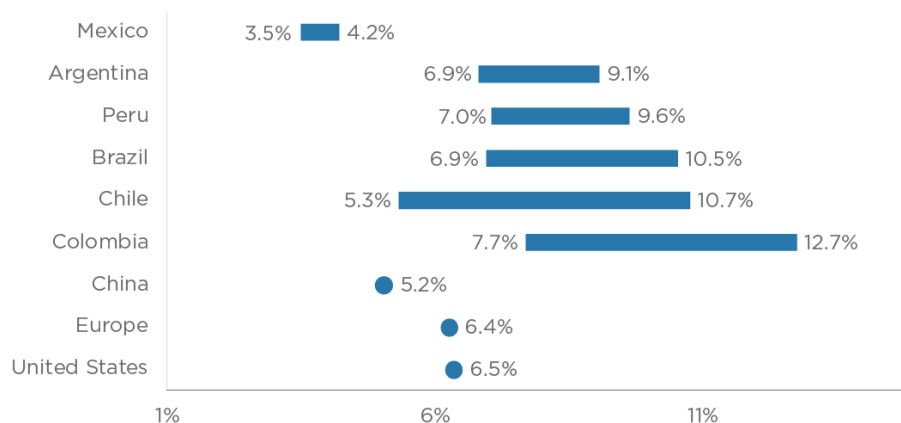
Source: UNEP (2022b, 20).

Several studies have estimated the cost for Latin American and Caribbean (LAC) countries of implementing the NDCs; others have calculated the cost of transitioning to a net-zero economy. For example, Krishnan et al. (2022) conclude that transitioning to a net-zero economy for Latin America will require annual average spending of US\$0.7 trillion (or 12.8 percent of LAC's GDP) between 2020 and 2050 on physical assets for energy and land-use systems, with fossil fuel-producing countries having greater needs than others.

According to Galindo, Hoffman, and Vogt-Schilb (2022), LAC will need annual spending between US\$470 billion and US\$1.3 trillion by 2030 to achieve its climate goals. Based on that report, the Inter-American Development Bank (IDB) concluded that achieving the climate goals in LAC will not be feasible without advancing across multiple sectors such as energy, transportation, water, agriculture, and ecosystem conservation (Yépez, 2022). Looking only at mitigation needs, Cárdenas and Orozco (2022) concluded that the approximate required annual investment for the six largest economies in LAC (referred to as LAC-6) would be an average of 7 to 11 percent of GDP

per year between 2020 and 2050.⁷ Figure 7 presents the average annual expenditure (as a percentage of GDP) required from LAC-6, China, Europe, and the United States to implement their NDCs.⁸ For LAC-6, It depicts the minimum and maximum expected expenditures necessary to achieve current NDCs.

Figure 7. Expenditure Required to Achieve NDCs (percent of annual GDP, 2020–2050)



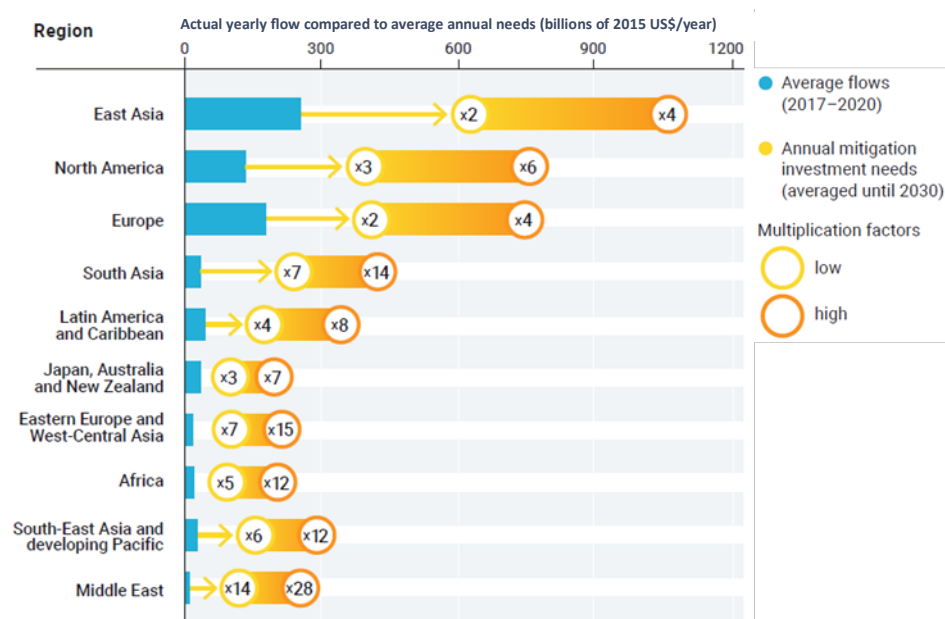
Source: Cárdenas and Orozco (2022, 23).

The LAC region must increase its financial flows for mitigation four- to eightfold by 2030, while global mitigation investments need to increase sixfold (Kreibiehl et al., 2022). This means that LAC must increase its financial flows for mitigation from about US\$38 billion per year (2015 prices) to somewhere between US\$152 (2015 investment multiplied by four) and US\$304 billion per year (2015 investment multiplied by eight) (UNEP, 2022b). The sector with the lowest investment flows is agriculture, forestry, and other land use, where funds will need to increase by a factor between 10 and 31 (Figure 8).

⁷ The range reflects climate change goals set by each LAC country and differences in projected costs of transitioning to low-carbon economies across different sectors, as well as uncertainties in technological advancements and market dynamics. For example, carbon abatement costs are uncertain, ranging US\$200–300 per ton of CO₂ equivalent.

⁸ It is important to note that these costs only refer to mitigation efforts in LAC's NDCs. It does not consider adaptation costs included in the NDCs.

Figure 8. Finance Flows and Mitigation Investment Needs by Region by 2030

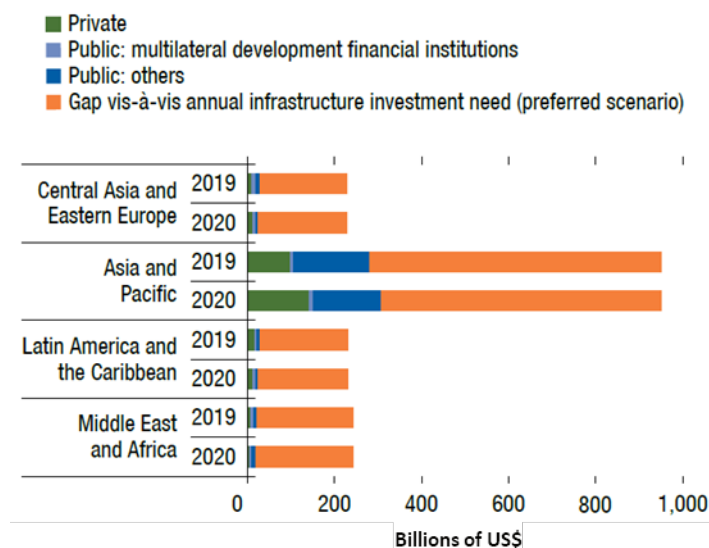


Source: UNEP (2022b, 66).

Note: Low and high multiples refer to the minimum and maximum levels of investment that each region should undertake to achieve mitigation goals. The low multiplication factor denotes the extent to which investments need to be augmented to align with the desired levels for mitigation. Conversely, the high multiplication factor indicates the substantial increase required in investments to meet the targeted mitigation objectives effectively.

The mitigation finance gap is widening across emerging and developing economies. Data from the International Monetary Fund (Figure 9) is consistent with other sources and scenarios regarding the mitigation finance gap for developing countries, and according to the Climate Policy Initiative (2021) LAC requires an annual investment in mitigation of at least US\$230 billion, in contrast to US\$30.4 billion in 2020. Public finance will be crucial in encouraging new investments with innovative fiscal policies.

Figure 9. Global Climate Finance Flows in Mitigation and Infrastructure Need by Region



Source: IMF (2022b, 51).

3.2. Investments Required for Adaptation

The increasing GHG emissions and rising temperature will generate a feedback loop between mitigation and adaptation that will persist and strengthen in the following decades. As emissions continue to rise, the demand for adaptation projects and investments will increase, but the capacity to effectively address climate impacts will struggle to keep pace.

Estimates about the needs in adaptation finance are challenging due to the absence of a clear and agreed-upon adaptation goal and the continuously increasing adaptation requirements. There is a comprehensive range of estimates about adaptation finance needs depending on differences in targets, future scenarios, methods, assumptions, and coverage; finance ministries (FMs) should arrive at more accurate adaptation finance needs, investing in scientific research on adaptation capabilities and project structuring. Securing additional finance and effective implementation, strengthening monitoring and evaluation mechanisms, and fostering deeper international cooperation are also important goals.

Despite the increasing adaptation financial flows for developing countries, the adaptation gap is highly likely to widen. International adaptation finance flows for developing countries reached US\$28.6 billion in 2020 (UNEP, 2022a). Notwithstanding

the increase in projects and international finance adaptation flows, investment needs fall way behind the adaptation costs estimated by the United Nations Environment Programme (UNEP) in its Adaptation Gap Report (AGR) and the Working Group II Sixth Assessment Report from the IPCC (IPCC WGII AR6) (Table 1). To align with the estimated required investments outlined by the AGR and the IPCC, current investments must increase by at least 5.7 times and 4.5 times, respectively. Specifically, the AGR estimates the adaptation finance needs for 2021-2030 in LAC between US\$8 and US\$62 billion annually; UNEP (2022a) estimates adaptation finance needs between 0.16 and 1.25 percent of GDP.

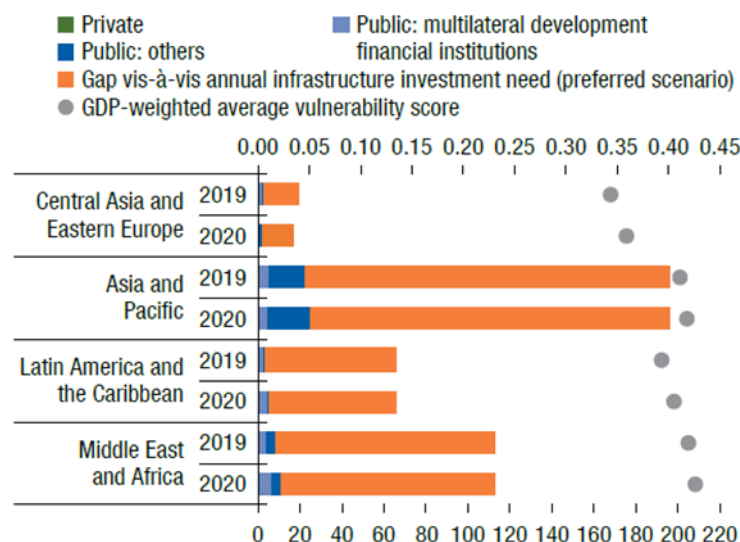
Table 1. Annual Projected Costs of Adaptation for Developing Countries

	2030	2050
AGR	US\$160 billion/year to US\$340 billion/year	US\$315 billion/year to US\$565 billion/year
IPCC WGII AR6	US\$15 billion to US\$411 billion/year (median US\$127 billion/year)	US\$47 billion to US\$1,088 billion/year (median US\$295 billion/year)

Sources: UNEP (2022a) and IPCC (2022b).

Investment in adaptation purposes, specifically in water and sanitation, irrigation, and flood protection, is severely deficient in LAC countries. Adaptation investment in LAC needs to be prioritized because it is one of the regions with the highest weighted average vulnerability score according to the IMF (Figure 10). In 2009, at the Copenhagen United Nations Climate Change Conference, developed countries pledged to provide US\$100 billion annually in climate finance for mitigation and adaptation to developing countries by 2020. This pledge was reiterated in the 2015 Paris Agreement. Compliance with this pledge would help countries in LAC increase investment in adaptation.

Figure 10. Global Climate Finance Flows in Adaptation, Infrastructure Investment Needs, and Vulnerability Score by Region



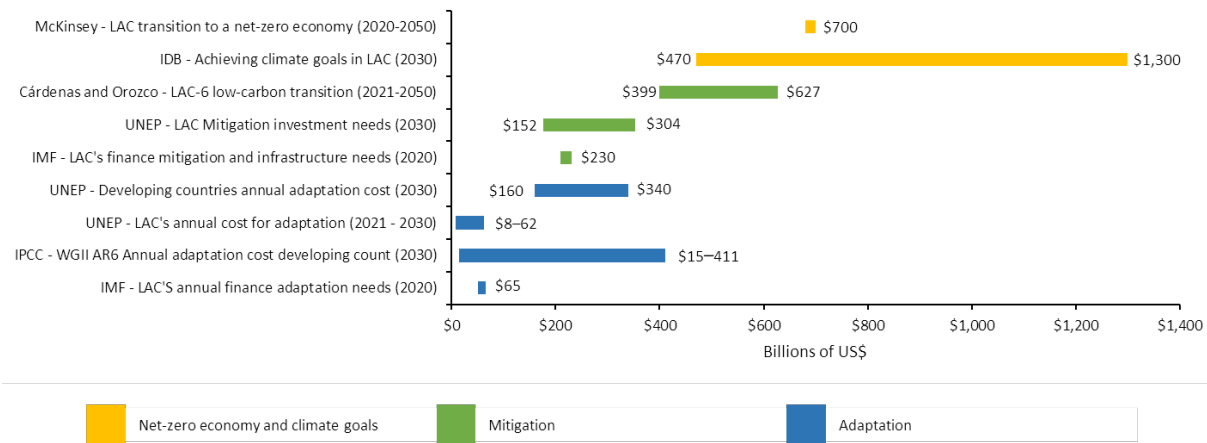
Source: IMF (2022b, 51).

Note: Numbers on the upper x axis indicate the average vulnerability score; numbers on the lower x axis are in billions of U.S. dollars.

3.3. Summary of Required Climate Change Investments in LAC

Mitigation and adaptation investment needs in LAC vary significantly across different sources. Numbers depend on the specific target, ranging from implementing the first iteration of NDCs of the Paris Agreement to investments needed to transition to a net-zero economy or combining climate goals with the Sustainable Development Goals (SDGs) developed by the United Nations (UN). Figure 11 illustrates the substantial disparity between these analyses. Regardless of the source, current investments fall significantly short of the necessary levels, underscoring the pivotal role of FMs (and fiscal policies in particular) and the private sector in driving additional resources to meet the climate change needs in LAC.

Figure 11. LAC Climate Change Annual Investment Requirements Estimated by Various Sources



Sources: Authors' elaboration based on data from McKinsey (Krishnan et al., 2022), IDB (Galindo, Hoffman, and Vogt-Schilb, 2022), Cárdenas and Orozco (2022), UNEP (2022b), IMF (2022b), UNEP (2022a), UNEP (2022b), IPCC (2022b), IMF (2022b).

Note: The years after each source refer to the period by which these investments will be needed. The IPCC WGII AR6 (IPCC, 2022b) estimates annual adaptation costs for all developing countries at US\$15-411 billion, while UNEP (2022a, 2022b) estimates them at US\$160-340 billion.

The high and substantial disparity between sources referencing mitigation and adaptation investment needs in LAC is mainly due to the lack of reliable information. Estimates of average annual climate-related financial flows in the region vary significantly from US\$21 billion (UNEP's annual cost for adaptation by 2030 for LAC [UNEP, 2022b]) to US\$885 billion (estimated by the IDB in achieving climate change goals in LAC [Galindo, Hoffman, and Vogt-Schilb, 2022]). In this regard, the first barrier to assessing reliable climate financial needs for LAC is the lack of information; UNCTAD contends that just one-third of emerging markets and developing economies (EMDEs) have managed to convert their energy transition objectives into precise investment needs (UNCTAD, 2023). This shortfall has consequences for these nations' capacity to effectively secure funding, potentially affecting their ability to achieve climate-related objectives.

Scope and methodologies vary significantly, leading to disproportionate conclusions about climate change investment needs in the region. Some estimates focus solely on the power sector, others encompass all energy systems and their end uses, and some include adaptation requirements (Palacios and Guzmán, 2023). In addition, some estimates contain the investment needed to decarbonize sectors

beyond energy within the economy. Moreover, these assessments differ in considering investment in the oil and gas sector during the energy transition and diverge in their assumptions regarding carbon prices, which they use to model different impacts, scenarios, and costs associated with energy transitions.

Estimates regarding the investment requirements in LAC do not uniformly adhere to a single emissions reduction scenario. Some of these estimates consider that the investment must align with a net-zero emissions scenario to limit the global temperature increase to 1.5°C by 2050 (Palacios and Guzmán, 2023), while others use a 2°C warming goal by 2050. Additionally, some estimates are rooted in projections of investment needs based on countries' NDCs by 2030, which might not necessarily align with these scenarios.

The disparities between estimates underscore the importance of the initial step in achieving climate goals in the LAC region, which is to accurately measure financing needs (Palacios and Guzmán, 2023). Adaptation estimates are beginning to be included in LAC's climate change financial needs. Still, countries have not yet comprehensively quantified their investment needs for adaptation in their NDCs and related documents (Palacios and Guzmán, 2023). Moreover, estimates of investment needs for the energy transition in LAC vary significantly, depending on the sectors covered, decarbonization objectives, and the purpose of investment (mitigation and adaptation). Only 22 percent of the LAC's NDC-stated needs have official cost estimates (Palacios and Guzmán, 2023). This highlights the imperative need to first address the required estimates in order to later formulate and deploy financing strategies to fund climate change needs.

3.4. Mitigation and Adaptation: Complementarities and Tensions

Investment needs for mitigation and adaptation are very large, and the urgency to limit global warming and prevent irreversible consequences for human and natural habitats has led governments to prioritize mitigation efforts over adaptation. Continuous degradation of the global climate has made governments aware of the urgency to tackle global warming with increasing mitigation efforts. However, their wariness lacks sufficient urgency to act on adaptation needs. Irreversible impacts to the global environment will make adaptation a necessity to encourage sustainable development, especially in the Global South.

However, mobilizing private sector investments for ambitious climate change adaptation projects poses significant challenges. Adaptation projects often lack immediate short-term returns and involve substantial investments with benefits that may take years to materialize. Consequently, the private sector's interest in such investments is lower compared with mitigation projects. Quantifying the benefits and financial returns of adaptation projects, which may involve avoiding long-term losses or mitigating various risks, remains complex, particularly due to the challenge of gathering sufficient data. Adhikari and Chalkasra (2021) highlight that the absence of financially viable projects or comprehensive national policy frameworks further hinders private investment in adaptation. Key challenges include the absence of standardized metrics for project evaluation, difficulty in monitoring adaptation progress, limited data availability, and the private sector's prioritization of short-term, measurable returns. These challenges underscore the need for a comprehensive policy framework to incentivize and facilitate private sector involvement in climate adaptation initiatives.

Governments are increasingly recognizing the necessity and complementarity of mitigation and adaptation efforts to effectively address climate change. Without adequate mitigation measures, climate change could outpace the capacity of natural and human systems to adapt, potentially resulting in significant social, environmental, and economic costs. Mitigation aims to prevent uncontrollable consequences, while adaptation manages inevitable changes. Complementary interactions between mitigation and adaptation efforts are evident, with initiatives such as waste-to-compost projects in Bangladesh simultaneously reducing GHG emissions and enhancing soil quality in vulnerable areas. Similarly, integrating mitigation and adaptation measures through activities like greening urban areas and implementing energy efficiency strategies yields co-benefits and cost savings. It is imperative for governments to prioritize the identification and implementation of such projects to effectively reduce emissions while adapting to climate variability.

Nevertheless, conflicts between climate change mitigation and adaptation efforts may arise. A clear example of this tension is the fact that the use of air-conditioning during heat waves leads to increased emissions while also improving living conditions. Recent initiatives have underscored ways in which adaptation projects and policies can be counterproductive to mitigation efforts. For example, the growing utilization of biofuels can result in land-use trade-offs that undermine adaptation efforts

while offering a sustainable energy alternative. Additionally, constructing adaptation infrastructure like seawalls may enhance resilience but also exacerbate emissions. Recognizing and addressing these conflicts is vital for achieving a balanced and integrated approach to climate policies.

At present, existing guidance on policy decisions for climate change mitigation or adaptation often lacks identification of potential conflicts and offers limited guidance to address these dilemmas. National and local governments have managed climate change adaptation and mitigation strategies without addressing their potential synergies, conflicts, or trade-offs (Grafakos et al., 2019). In fact, "in the early years of UN-led global governance for climate change, misguided hope led many to conclude that mitigation efforts would be effective, and adaptation was viewed as both more abstract and more temporally distant" (Dale, 2022, 23).

To face rising opportunities and dilemmas between mitigation and adaptation, countries must implement a comprehensive approach that creates synergies between both to effectively address climate change. This integration can yield co-benefits and cost savings but requires coordinated collaboration among stakeholders including various levels of government, the private sector, and civil society organizations. Without coherent integration, countries will not achieve an effective response to climate change. Moreover, after such synergies are developed, fiscal policies will play a crucial role in ensuring complementarity and reducing tensions while catalyzing private investment. Appendix A reviews in detail the rising complementarities and dilemmas between mitigation and adaptation and how countries should approach them.

3.5. Do Countries in LAC Have Fiscal Space to Increase Investments in Climate Change?

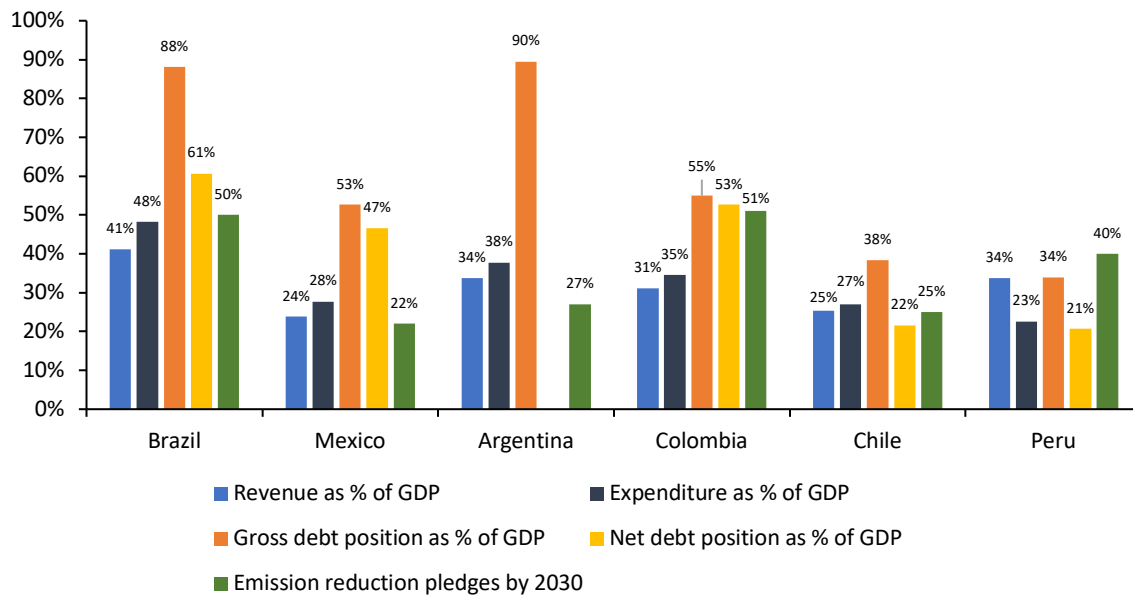
Countries in LAC face diverse challenges when increasing their commitments to finance climate change mitigation and adaptation. The region is facing various economic, political, environmental, infrastructure, and social challenges that demand additional investment of resources for the well-being of the population. The COVID-19 pandemic left increased social needs and unrest across the region and governments are trying to appease them through policies in sectors such as education, health, and pensions, including a significant increase in the use of cash transfers. This is why requiring

governments to increase their investments and financial flows toward climate change and energy transition seems unrealistic.

Nevertheless, analyzing the fiscal landscape of the six largest economies in LAC shows that there is still room for increasing public investment in climate change without overlooking the needs of other sectors. It is possible to take on more debt as a percentage of GDP for climate change purposes without putting at risk the financial macro stability of each country. According to the IDB (2023a), on average, countries in LAC should aim for a debt level around 54 percent of their GDP. When considering different types of economies, those heavily reliant on commodities tend to maintain lower debt levels, given the potential for larger economic shocks. In contrast, diversified economies typically have similar prudent debt levels to the regional average, while countries dependent on tourism show slightly higher levels of debt.

In this regard, some LAC countries would still have opportunities to increase their debt without causing significant fiscal risk. It is critical to mention that this is not the case for every country, considering their emission reduction pledges through 2030. Figure 12 presents the leading fiscal indicators compared to emission reduction pledges, underscoring that some countries with high debt levels and very ambitious climate mitigation pledges could be at risk of compromising their debt sustainability. Balancing climate investments and debt sustainability will be challenging, and countries should think about ways to reduce the tensions of these two goals such as implementing carbon taxes or debt-for-climate swaps. However, the trade-off is relatively short-sighted: in the future, failure to deal with climate risks will cause much greater fiscal risks as well. Meeting the required climate change investments is also a way to ensure fiscal sustainability.

Figure 12. Analysis of Fiscal Landscape to Address Climate Change in LAC



Source: Authors' elaboration based on IMF (2023).

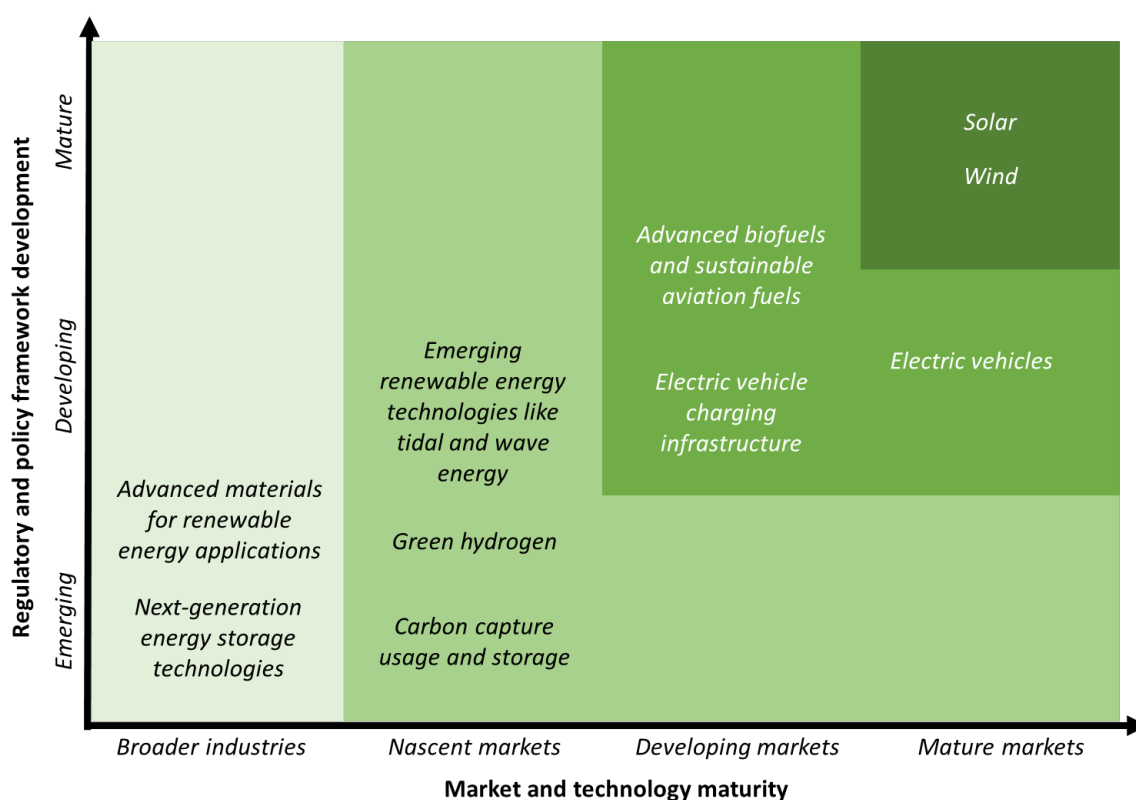
Despite diverse challenges, countries in LAC must increase financial commitments for climate change mitigation and adaptation. Careful fiscal analysis reveals potential for augmenting public investment in climate initiatives without compromising macroeconomic stability, especially for certain LAC nations. Prudent planning of comprehensive climate strategies is an essential part of the conversation with the IMF, global rating agencies, and multilateral development banks (MDBs). Thus, while some countries may have room to increase debt for climate purposes, this approach should be balanced and aligned with emission reduction pledges and carefully include investments in comprehensive climate change plans and be in line with their medium-term fiscal frameworks (MTFFs).

3.6. Developing the Investment Ecosystem in LAC

As highlighted earlier, LAC faces the monumental task of securing significant capital to address pressing infrastructure needs and accelerate projects related to mitigation and adaptation. However, the precise resources that LAC governments must mobilize remain unclear. FMs must redirect current investments to sustainable and climate change purposes (and away from fossil fuel subsidies). Defining budgetary priorities will be the source of much tension, especially in the context of rising social and economic

demands due to the low growth outlook. Although not responsible for deploying the totality of the funding needed, FMs will need to play a catalytic role to attract private investment. As technologies and markets mature, the private sector will be willing to structure and implement projects. However, without a proper regulatory and policy framework, high risk perception can limit private capital deployment (Figure 13). Long term, consistent policies are needed to provide investors with minimum legal certainty. By strengthening these regulatory and policy structures, FMs can progressively reduce their capital contributions while incentivizing more significant private sector investment. In this context, FMs must assess the maturity of different markets and technologies. Solar and wind projects, for example, are being led by the private sector, while public investments will likely be required for the electrification of public transportation, emissions reduction associated with deforestation, and adaptation projects.

Figure 13. Policy Framework vs Market Maturity for Driving Investments in Climate Change and Energy Transition



Source: Authors' elaboration.

Note: Darker green indicates areas where the private sector can play a leading role.

As FMs deploy instruments and strategies to foster private sector involvement in climate change, it becomes imperative to address the broader approach to financing climate change initiatives, acknowledging the tensions and complementarities between private and public sector investments. Increased private sector spending may lead to reduced needs for public sector investment, while higher tax and credit incentives for the private sector could limit resources available for direct public investment. Therefore, finding the right balance between these aspects is a significant challenge for FMs, one that extends beyond simply balancing mitigation and adaptation efforts. This challenge underscores the importance of strategic financial planning and policy frameworks that effectively leverage both public and private sector resources to address climate change. By navigating these tensions and complementarities, FMs can play a pivotal role in mobilizing capital and facilitating the transition towards a sustainable and resilient future. A taxonomy of trade-offs (and not just a green taxonomy as we will see below) is a crucial tool that FMs should develop.

4. Policy Instruments for Mitigation and Adaptation: An Overview of the FM Toolbox

To support and accelerate climate action, directly or through other government entities and stakeholders, finance ministries (FMs) can lead and coordinate economic strategy and fiscal policy, regulate the financial system, and allocate government expenditure (Coalition of Finance Ministers for Climate Action, 2023). Furthermore, implementing climate change policies through FMs will be essential in achieving additional co-benefits such as macro stability, economic growth, employment, and responsible management of public finances.

FMs can promote the development and issuance of green financial instruments, such as thematic bonds, green taxonomies, and green bond frameworks. They can establish guidelines and standards for these instruments to ensure transparency, credibility, and alignment with climate and environmental objectives (Coalition of Finance Ministers for Climate Action, 2023). FMs can also provide incentives, such as tax credits or subsidies, to encourage investments in climate change projects and technologies. Carbon pricing mechanisms such as carbon taxes or emissions trading systems (ETSs) can be introduced to create economic incentives for reducing greenhouse gas (GHG) emissions (Coalition of Finance Ministers for Climate Action, 2023). These instruments must be aligned with other public entities to ensure policy coherence.

Fiscal policy instruments will be crucial to achieving the required levels of climate change investments. FMs have emerged as pivotal actors in driving climate action. Public finance innovation has become essential in creating novel strategies and mechanisms to channel the necessary funds to finance mitigation and adaptation efforts. However, FMs must still consolidate their leadership, collaboration, and tools to effectively drive climate action beyond spending and taxation. This chapter aims to analyze the range of instruments that FMs can deploy, in the specific context of LAC countries, around three main pillars: (i) developing climate strategies for nations, (ii) creating the right incentives to mobilize climate financing, and (iii) ensuring fiscal management consistent with climate goals.

First, in developing national climate change strategies, FMs' involvement is pivotal, extending beyond mere cost estimation or resource allocation. By actively engaging in strategy design, FMs should align climate strategies, plans, and programs

with medium-term fiscal frameworks (MTFFs). Secondly, FMs possess a diverse array of incentives to mobilize climate investments, ranging from regulatory design to the removal of fossil fuel subsidies and the promotion of renewable energies through subsidies and thematic bonds. These incentives serve as catalysts for driving sustainable investment and fostering green economic growth. Lastly, ensuring fiscal management consistent with climate goals requires strategic tools such as green budgeting, green tagging, and green procurement, alongside analytical frameworks and capabilities. Additionally, state-owned enterprises (SOEs) emerge as key implementation actors, in particular because FMs have significant influence over their management.

4.1. Developing Climate Strategies for Nations: Ensuring Fiscal Viability in Plans

FMs need to enhance climate action by working with other ministries and technical entities in determining what can be financed and creating synergies and coherence with other short- and medium-term development objectives. FMs play a decisive role for the implementation of climate investment strategies that are consistent with overall macro and fiscal stability.

4.1.1. Role in National Climate Change Strategies

FMs must play a crucial role in the development of climate change strategies. While ministries of energy and environment often lead in strategy design, FMs ensure fiscal viability. To enhance climate change policies, FMs in LAC countries should actively craft comprehensive investment plans and programs for mitigation and adaptation. By doing so, FMs can precisely evaluate the financial requirements for climate action and efficiently allocate resources, taking advantage of their strategic role in tax and expenditure decision-making (OECD, 2020). Additionally, it is imperative that FMs actively participate in discussions to ensure proposed strategies align with fiscal feasibility, with finalized plans necessitating FM approval.

Mitigation and adaptation strategies backed by FMs will have better chances of successful implementation. FMs can guarantee that well-defined investment approaches reinforce climate initiatives; that these investments are facilitated through the support of macroeconomic, fiscal, and related policies; and that funding can be secured through a blend of public, private, and alternative capital sources (Coalition of Finance Ministers for Climate Action, 2023).

The active involvement of FMs will significantly improve national climate plans. Examples of instruments for national climate planning include long-term climate strategies, nationally determined contributions (NDCs), energy transition strategies, green taxonomies, and national adaptation plans. When FMs actively participate, these instruments can also serve as valuable tools for identifying investment priorities, assessing budget-related risks and opportunities, and finding ways to seamlessly integrate climate actions into the ministry's routine operations (Coalition of Finance Ministers for Climate Action, 2023).

FMs can also participate in implementing and monitoring national climate change plans. The involvement of FMs in national climate change plans goes beyond design; they can join the implementation and monitoring of projects, plans, and strategies. FMs can contribute to implementation by ensuring that required financial resources are available and supporting other ministries and public entities in accessing international climate finance. Furthermore, FMs can create mechanisms for monitoring, tracking, and reporting climate finance implementation and assessing the allocation and quality of spending, incorporating lessons learned into plans and projects (Coalition of Finance Ministers for Climate Action, 2023).

Green stimulus packages (GSPs) have become common as governments seek sustainable economic growth in response to crises. GSPs are economic policies and strategic investments designed to promote economic growth and job creation while reducing GHG emissions and addressing climate change. GSPs can have a wide range of fiscal and economic measures to tackle climate change effectively such as investments in green infrastructure, tax credits for strategic green technologies, production tax credits, research and development (R&D) initiatives, education and training, incentives, and regulations to reduce emissions and increase green sustainable industries and infrastructure (Barbier, 2020). Involvement of FMs will be key in facilitating and incorporating green considerations into fiscal stimulus plans during times of recession or urgent need of economic stimulus, thereby accelerating the implementation of long-term plans.

4.2. Creating the Right Incentives to Mobilize Climate Financing

The second pillar through which FMs can deploy mechanisms to support climate change investments is the creation of adequate incentives. This involves the design of

new incentives for diverse technologies, but also removing those that can discourage an urgent energy transition. This section discusses the different mechanisms available for FMs to mobilize climate finance and discourage the use of fossil fuels.

4.2.1. Influence on the Design of Regulation

In their regulatory roles, FMs can no longer ignore climate change. In those cases where FMs have financial regulation and supervision roles, they should internalize climate risks on the operations and balance sheets of the financial sector. For example, FMs should issue binding regulatory rules related to climate and supervisory measures in the financial sector.

Central banks, FMs, financial regulators, and supervisors are increasingly aware of financial risks resulting from climate change. Climate change affects the ability of households and enterprises to repay debt, reduces bond and stock prices, and negatively impacts the financial position of companies heavily reliant on carbon-intensive practices and their lenders (Dafermos, 2022). In this context, FMs have the responsibility to safeguard the financial system by leading and guiding policies and regulation to increase climate finance, improve climate change risk management, support the development of green financial products and incentives, and collaborate with regulatory authorities to establish frameworks that prioritize climate considerations in the financial sector.

FMs play a crucial role in influencing the design of financial regulation. In many countries, FMs have the mandate to shape the policy and regulatory frameworks that govern financial markets. They can introduce regulations that incentivize or require financial institutions to consider climate-related risks and opportunities in their decision-making processes (Dafermos, 2022). Moreover, FMs can encourage financial institutions to assess and disclose climate-related risks in their portfolios. They can require banks and other financial entities to conduct stress tests and scenario analyses to evaluate the potential impact of climate change on their assets and operations (Dafermos, 2022).

As pivotal architects of financial ecosystems, FMs can significantly influence the design of sustainability and climate-related disclosure regulations. Implementing International Sustainability Standards Board (ISSB) norms, particularly NIIF S1 and S2, is essential for creating a standardized, comparable, and reliable framework for disclosing

sustainability and climate-related risks in LAC capital markets (IDB, 2023b). Embracing these standards can foster global alignment, ensuring local regulations harmonize with international practices and enhance participation in global markets. Notably, Chile and Colombia's regulations can serve as models, while other countries are advised to align their disclosure policies with these standards from the outset. Additionally, establishing transparent reporting, supported by sector-specific questionnaires or templates, can streamline the monitoring process, ensuring high-quality standardized information (IDB, 2023b).

FMs assume a central role in shaping regulatory frameworks by strengthening institutional capacities for robust sustainability disclosure. This involves establishing dedicated units within regulatory bodies, fostering cross-sectoral dialogues, and formulating comprehensive roadmaps. Ensuring specialized training for officials and harnessing technological tools for efficient supervision is paramount (IDB, 2023b). FMs can also amplify their influence by devising effective communication strategies that facilitate the seamless implementation of disclosure regulations and contribute to the convergence of international standards (Jiménez and Visconti, 2023).

Disclosure is a crucial aspect for driving sustainable investments. FMs can require early information disclosure and transparency adoption to improve investors' rapport and confidence in financial markets. It is critical to enhance transparency and disclosure among investors regarding the sustainable use of resources and the impacts generated by their portfolios. This approach makes investors accountable for risk mitigation and seizing opportunities related to the United Nations' Sustainable Development Agenda. Financial reporting should adhere to international standards, enhancing the quality and comparability of data for analysis and decision-making purposes.

FMs can leverage existing frameworks to design regulatory and climate change disclosure systems. The landscape of climate reporting methodologies and regulations has evolved significantly since the 2016 Paris Accord. A wide range of frameworks including the Climate Disclosure Standards Board (CDSB),⁹ the Task Force on Climate-

⁹ CDSB is a multinational collaboration between business entities and environmental NGOs that started in the UK. It is dedicated to progressing and harmonizing the worldwide standard for corporate reporting within an ESG framework.

Related Financial Disclosures (TCFD),¹⁰ and the Corporate Sustainability Reporting Directive (CSRD)¹¹ are already being implemented to increase and strengthen climate change and sustainability reporting in the private sector. Environmental, social, and governance (ESG) reporting through worldwide voluntary and mandatory frameworks will increase firms' transparency and disclosure of environmental impact including carbon emissions, energy consumption, and climate-related risks. These methodologies and frameworks provide structured approaches for organizations, financial institutions, and the broader market to assess and transparently disclose climate-related risks. Additional information will enhance climate risk identification and mitigation, especially those related to physical and transitional risks, providing additional information for investors.

ESG and sustainability disclosure will likely drive green investments within LAC. The growing demand for ESG and sustainability metrics disclosure will allow new investors to identify companies that align with their core values and sustainability goals. Disclosure frameworks and methodologies already implemented will create a more reliable regulatory and legal ecosystem; additional information increases market confidence, regulatory compliance, informed decision-making, and competitive advantage over other regions and markets. Moreover, disclosing climate-related information will catalyze markets and investments to expedite their transition toward climate-resilient assets and sustainable business models. Neglecting to adapt to the evolving climate landscape and global sustainability trends poses a significant risk, potentially leading to business disruptions and long-term loss of value.

The more reliable the markets, the more investments they will attract. By enhancing regulatory frameworks and promoting transparent information disclosure, FMs can bolster confidence in their markets, thereby attracting increased green investments for climate mitigation and adaptation efforts. A crucial aspect of achieving these climate-related objectives is fostering robust public-private collaboration and engagement. Climate change financing and the attainment of associated goals are not

¹⁰ TCFD is a global initiative established by the Financial Stability Board (FSB) to develop voluntary, consistent climate-related financial risk disclosures for companies to use when providing information to investors, lenders, insurers, and other stakeholders.

¹¹ CSRD is a European Union initiative aimed at enhancing corporate transparency and sustainability reporting standards.

solely the public sector's responsibility; without substantial involvement from the private sector, the necessary transitions and investments are unlikely to be realized.

4.2.2. Removing Fossil Fuel Subsidies

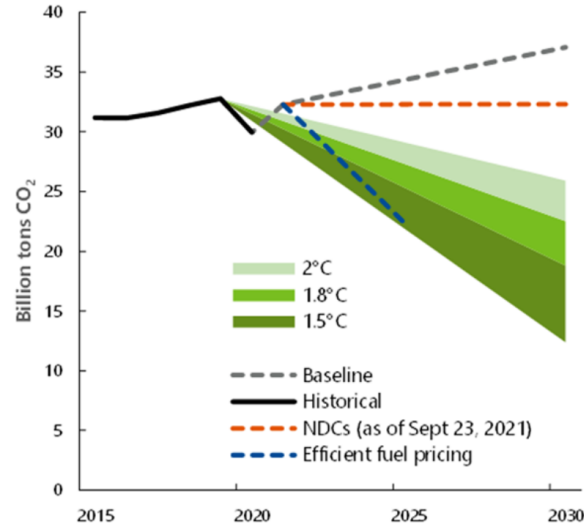
Removing fossil fuel subsidies, including those on polluting fuel (e.g., coal) and electricity generated from fossil fuels, is essential to incentivize clean energy consumption, leveling the playing field for renewable energy (Jewell et al., 2018). In this regard, fossil fuel subsidy reform is a crucial action recommended by the IPCC and the International Energy Agency to accomplish ambitious emissions mitigation objectives (Rentschler and Bazilian, 2016). At the same time, subsidies can encourage the adoption of clean technologies such as renewable energy, batteries, hydrogen, or energy-efficient alternatives by decreasing costs, promoting a low-carbon economy, and making them financially accessible for various stakeholders.

By 2022, fossil fuel subsidies represented 7.1 percent of global GDP (US\$7 trillion) and are expected to rise to US\$8.2 trillion by 2030 due to increased fossil fuel demand in emerging economies (IMF, n.d.).¹² On the other hand, renewable energy subsidies are expected to rise to US\$180–250 billion annually by 2035 (Espa and Rolland, 2015), highlighting the extraordinary contradictions concerning energy subsidies. Specifically, LAC destines 0.9 percent of regional GDP (nearly US\$0.5 trillion) to explicit subsidies on fossil fuels according to the IMF (Black et al., 2023).

Increasing fuel prices to their optimal levels could result in a 36 percent reduction in forecasted global fossil fuel CO₂ emissions compared to the 2025 baseline (IMF, n.d.). Fossil fuel subsidies encourage inefficient energy consumption, generate pollution, and are not efficiently targeted to low-income populations. Phasing out this subsidy can level the playing field with other clean technologies and fuels, decreasing CO₂ emissions. In addition, lifting fossil fuel subsidies will provide additional revenue for governments to spend either on climate change initiatives or social programs. Figure 14 presents the possible CO₂ reduction by 2025 if fossil fuel subsidies are phased out. In this scenario, emissions could stay on track to achieve the Paris Agreement's target of limiting global warming to 1.5–2°C.

¹² In 2022, 18 percent of the subsidy could be attributed to the underpricing of supply costs (explicit subsidies), while the remaining 82 percent resulted from the underpricing of environmental costs, unpriced externalities, and the absence of consumption taxes (implicit subsidies) (IMF, n.d.).

Figure 14. CO₂ Emissions Reduction Due to Efficient Fuel Pricing



Source: IMF (n.d.).

Nonetheless, phasing out fossil fuel subsidies can have different results depending on each country's socioeconomic context and energy mix. According to Jewell et al. (2018), eliminating subsidies would result in emissions reductions that fall short of the goals set by the Paris Agreement in some countries, while in others it could lead to an increase in emissions if fossil fuels were replaced with other more polluting fuels. Fossil fuel subsidy removal would lead to the most considerable CO₂ emission reductions in high-income and oil- and gas-exporting countries. This is why countries must design and implement comprehensive subsidy reforms to successfully use this tool as a climate change initiative and lower carbon emissions. Among the strategies, countries should consider the following (IMF, n.d.):

- Develop a comprehensive energy sector reform plan with impact analyses
- Gradually reduce polluting fuel use
- Implement institutional reforms that depoliticize energy pricing
- Encourage competition in the renewable energy industry
- Redirect subsidies to renewable investments
- Take measures to protect low-income families affected by subsidy reforms such as through targeted cash or near-cash transfers

4.2.3. Renewable Energy Subsidies

Renewable energy and clean technologies subsidies can significantly assist climate change mitigation efforts. However, it's essential to first assess the necessity and effectiveness of these subsidies, as well as their equity implications, before implementing them. Subsidies could be necessary to level the playing field between renewable energy sources and fossil fuels, ensuring that low-carbon-emitting technologies have equal opportunities for deployment. Additionally, subsidies may provide the right economic signals to encourage the adoption and scaling up of low-carbon-emitting technologies. Once the need is established, FMs should discuss the mechanisms available such as the following.

- **Direct Funding Allocation.** Government subsidies for renewable energy and clean technologies can be provided through direct funding allocation, which includes financial subsidies, low-interest loans, and grants (Song, Jia, and Jiao, 2022). For instance, in 2016, the United States unveiled an ambitious federal government budget proposal that allocated US\$7.4 billion towards clean energy technology programs across various agencies (Yu et al., 2016). Moreover, through different energy acts, the United States incorporated subsidies for residential renewable energy equipment purchases and allocated cash subsidies for clean energy investments. A financing guarantee system was also adopted (Song, Jia, and Jiao, 2022).
- **Price Control Subsidies.** Subsidies can be implemented through price control mechanisms, such as feed-in tariffs, where renewable energy producers are guaranteed a fixed price for the electricity generated (Song, Jia, and Jiao, 2022). Through this type of mechanism, governments encourage investments in renewable energy by providing financial assistance to projects that set a guaranteed above-market price under a long-term contract (usually 15 to 20 years). Germany implemented a successful feed-in tariff system in the early 2000s to promote developing and deploying renewable energy sources, particularly solar photovoltaic (PV) systems (Butler and Neuhoff, 2008). The German feed-in tariff has been widely acknowledged for driving the rapid expansion of solar PV installations; it attracted substantial investments and stimulated technological advancements and progress in the solar industry.

- Demand Assurance. Governments can provide demand assurance by committing to purchasing a certain amount of renewable energy or clean technology products. This creates a guaranteed market for renewable energy producers and reduces the risk associated with investment in these technologies (Yu et al., 2016).
- Compulsory Allocation. Some countries implement mandatory allocation mechanisms, where a certain percentage of energy production or consumption must come from renewable sources. This creates a market demand for renewable energy and encourages investment in clean technology (Song, Jia, and Jiao, 2022). For example, the government of Jordan set a target to obtain 10 percent of its energy needs from renewable energy resources by 2020 (Abu-Rumman, Khdair, and Khdair, 2020). Several European countries such as Germany, Denmark, and Spain have implemented successful auctions for renewable energy projects (Newbery, 2016). These auctions have facilitated the deployment of renewable energy technologies and contributed to the growth of the clean energy sector.
- Technology-Specific Policies. Governments can design policies targeting the development and deployment of renewable energy and clean technologies. These policies aim to support R&D efforts, promote innovation, and facilitate the commercialization of clean energy technologies. For instance, Yu et al. (2016) examines the relationship between government subsidies and private R&D investment in renewable energy enterprises in China, suggesting that government subsidies have a significantly positive impact on R&D intensity.
- Financial Incentives. FMs can complement subsidies, feed-in premiums, and auctions for power purchase agreements by using development finance institutions that provide financial incentives for these projects (Ibrahim, Shirazi, and Mohseni-Cheraghloo, 2021).

4.2.4. Public Financing: Use of Thematic Bonds

Issuance of thematic bonds has been increasing to finance different environmental and climate change initiatives. Thematic bonds, issued by public and private sector entities, can be grouped into two distinct categories: use-of-proceeds (UoP) bonds (FMs use funds raised to finance projects with a positive social and environmental influence) (UN ESCAP, 2021) and performance-linked or KPI bonds (with terms and conditions that

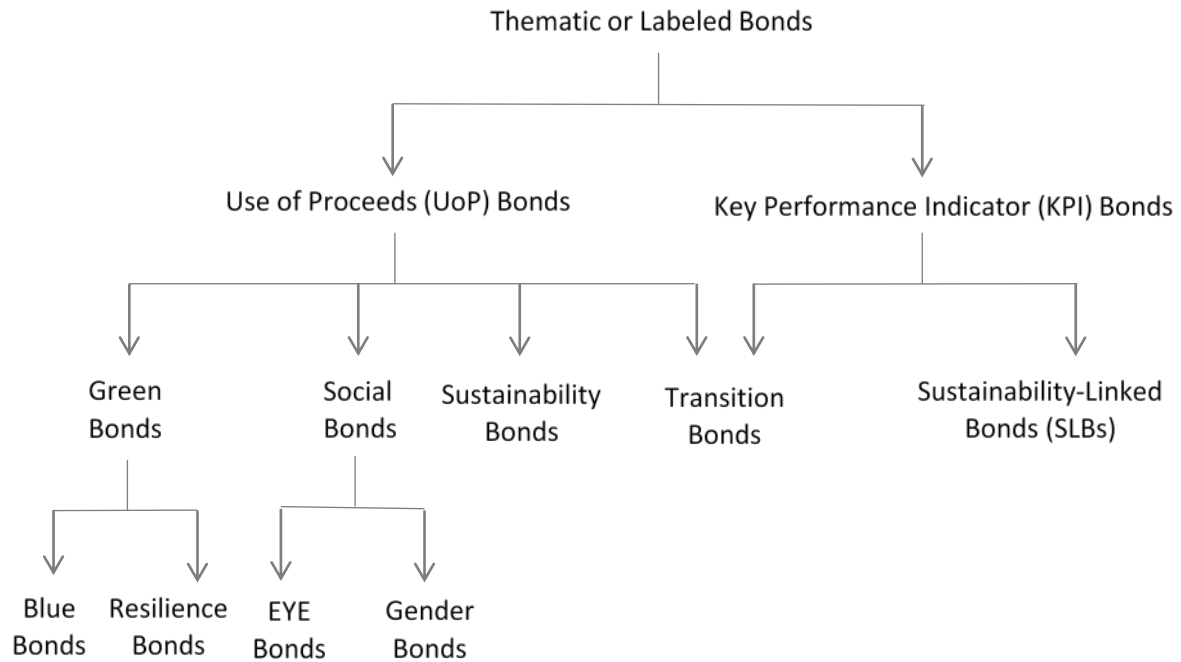
depend on achieving a key performance indicator [KPI]). Thematic bonds are similar to conventional fixed-income bonds, providing reliable returns to investors through a fixed coupon. Figure 15 summarizes the types of thematic bonds in the market.

Sovereign debt can act as a strategic source of financing to achieve net-zero goals and a climate-resilient transition (Coalition of Finance Ministers for Climate Action, 2023). Governments can actively use sovereign bonds to finance climate change mitigation and adaptation projects.

In the past, investors typically focused solely on financial and economic variables such as the risk profile of the bond issuer, its credit rating, and the rate of interest paid by the bond (UN ESCAP, 2021). Investors also consider other aspects such as how the bond issuer employs their resources and which kinds of projects the FM funds. The increasing interest and adoption of ESG principles create a unique opportunity for FMs to raise capital for diverse mitigation and adaptation projects (UN ESCAP, 2021).

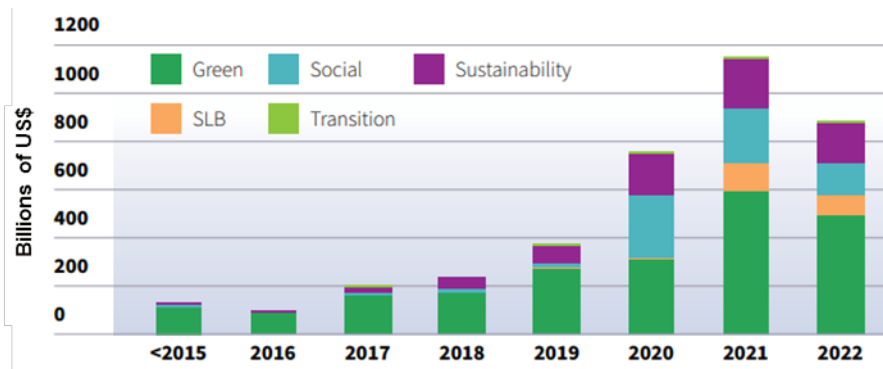
Green, social, and sustainable (GSS) bond issuance in the last decade has increased considerably, reaching US\$858.5 billion in 2022. Global GSS debt issuance grew constantly during the previous years (2016–2023), except in 2022, when the energy price spikes resulting from the war in Ukraine led to a surge in inflation rates (Climate Bonds Initiative et al., 2023). Figure 16 shows the amount and type of bonds issued between 2015 and 2022. Thematic bonds represent 5 percent of global bond market issuance.

Figure 15. Different Types of Thematic Bonds



Source: Jain (2022).

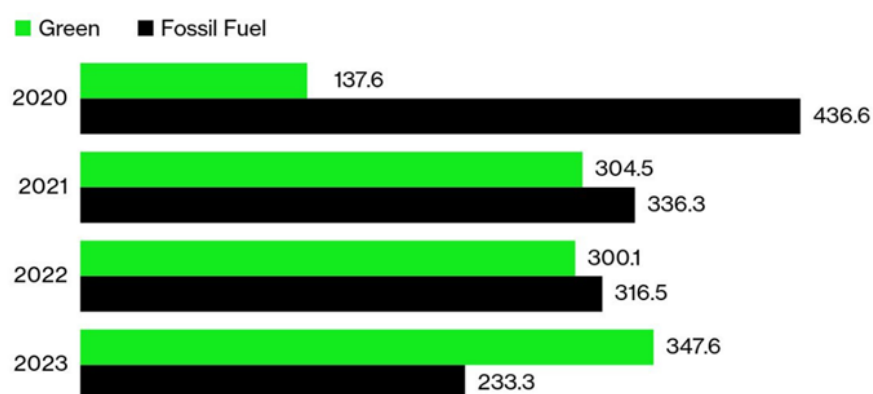
Figure 16. GSS Bond Issuance (2015–2022)



Source: Climate Bonds Initiative et al. (2023).

Environmental and social bonds are raising more funds than the fossil fuel industry. Recently, during the first half of 2023 (Figure 17), companies and governments obtained significantly higher funding from the debt markets for eco-friendly initiatives than for fossil fuel investments. This marks a notable shift in financial preferences towards environmentally sustainable projects and indicates a growing preference for investments that support sustainable and climate-friendly projects.

Figure 17. Green Debt vs Fossil Fuel Debt Issuance (January–June 2023, in billions of US\$)



Source: Quinson (2023).

The thematic debt market has supply constraints. Over the past decade, there has been a growing demand for thematic bonds, but to fully leverage their potential, governments—particularly in emerging and developing countries—must strengthen their financial market frameworks that provide standardized guidelines and criteria for issuing green or thematic bonds. This ensures transparency and clarity for investors, enhances investor confidence, promotes the development of a dedicated debt market, contributes to the pricing and risk assessment, and ensures alignment with national climate change strategies and international environmental and sustainability policies.

LAC has historically issued few thematic bonds. LAC's low thematic bond issuance is mainly due to the institutional complexity of setting up green bond frameworks, preference for issuing bonds in local currencies to avoid balance sheet crises, regulatory hurdles faced by foreign investors in accessing domestic markets, underdeveloped and illiquid domestic debt markets, and the perceived high monetary cost associated with external reviews and certifications for thematic bonds (Jain, 2022). Despite their potential benefits, these impediments limit LAC countries' ability to issue thematic bonds.

Transparency and accountability are crucial elements for thematic issuance success. Thematic bonds require issuers to disclose information on the use of proceeds and the environmental impact of funded projects. This enhances transparency and accountability, allowing investors to assess the environmental performance of the

projects they are financing. In this context, the FM assumes a pivotal role in thematic bond issuance. The FM not only participates in the planning and structuring of national initiatives and projects with investment potential but also establishes the guidelines, standards, and criteria for issuing thematic bonds. Additionally, the FM oversees the regulatory framework surrounding thematic and green bond issuance, ensuring adherence to international standards. Furthermore, the FM is responsible for monitoring and reporting the allocation of proceeds from thematic and green bonds, guaranteeing that they are utilized for their intended purposes, enhancing confidence in the market. To improve the thematic bond issuance process, FMs should consider the following steps proposed by the UNDP (2021):

1. Engage governmental stakeholders
 - a. Set goals
 - b. Engage ministries
 - c. Get early buy-in from the FM
 - d. Expand engagement with external stakeholders
2. Establish a green or Sustainable Development Goals (SDG) bond framework
 - a. Determine eligible sectors
 - b. Determine eligible types of expenditures
 - c. Set monitoring
 - d. Amend or develop required legislation
3. Identify eligible budget items
 - a. Assign key ministries to identify eligible projects from their budgets
4. Establish an independent external review
 - a. Select an independent verifier to assess the SDG or green credentials of the bond
5. Issue a pilot green or SDG bond
 - a. Develop supporting materials to promote transactions
 - b. Showcase financed projects and green bond framework
6. Monitor and report
 - a. Produce a report and update publicly available information on the bond at least annually

4.2.5. Green Taxonomies

Green taxonomies represent a novel tool for FMs, perhaps one of the most effective ways to strategically guide climate change decisions. According to the Coalition of Finance Ministers for Climate Action (2023, 144), a green taxonomy is “a classification system to identify environmentally sustainable economic activities that contribute to climate goals.” It comprises specific criteria for evaluating how economic activities and assets align with sustainability goals. It provides a clear signal to investors and stakeholders to aid their decision-making process and classify assets based on their contribution to achieving climate change objectives (Ehlers, Gao, and Packer, 2021).

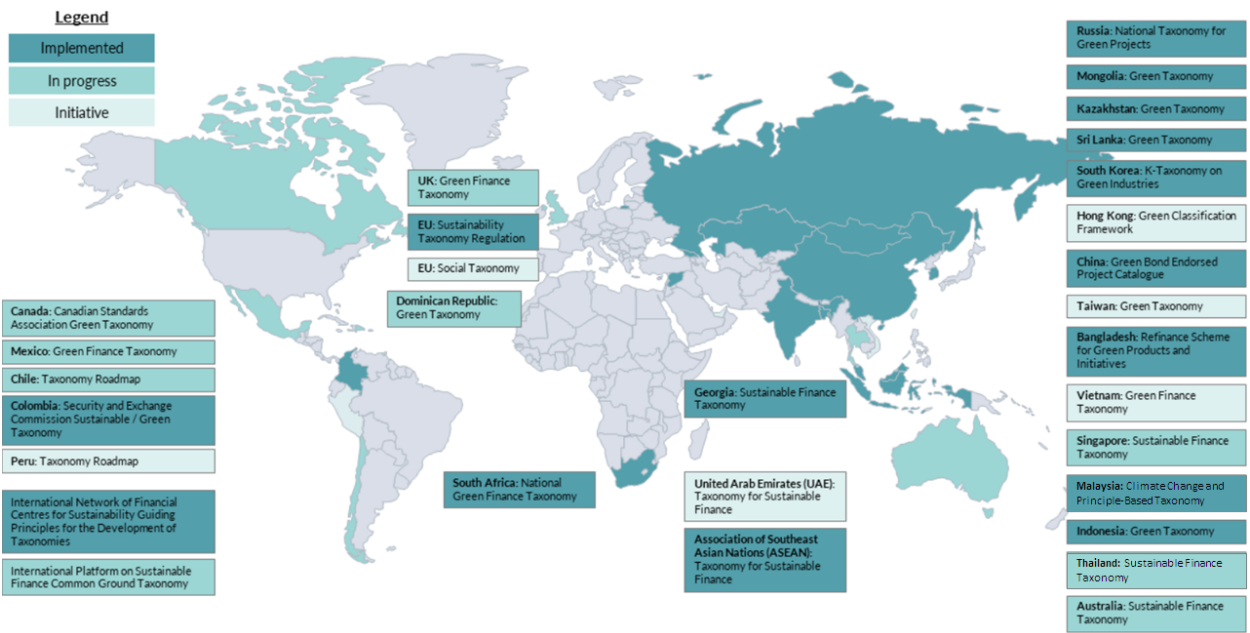
Green taxonomies create a common language between private, public, and multilateral investments to achieve climate change goals. Green taxonomies or sustainable finance taxonomies are a vital starting point to achieve climate change and environmental objectives; they provide clarity and transparency by establishing what economic activities and assets will contribute to achieving these objectives. Moreover, when implemented, green taxonomies allow investment in classified activities to be labeled as sustainable, which triggers additional benefits such as preventing greenwashing, helping investors make informed investment decisions, and channeling investments toward sustainable or green economic activities and assets (Thür, 2022).

Green taxonomies alone cannot scale up climate action and drive sustainable investments. A comprehensive set of fiscal policies, regulatory frameworks, supervision, financial incentives, and green taxonomies is essential for creating an attractive ecosystem to drive sustainable investments. Green taxonomies become a central tool to classify investments toward new or complementary instruments such as tax incentives. In this regard, green taxonomies can serve as the basis for establishing how FMs will provide tax incentives or subsidies to specific economic activities, assets, and investments.

Only a few countries have implemented green taxonomies. This is due to various factors including the complexity and diversity of sustainable finance frameworks, the lack of standardized criteria, and the absence of clear guidelines and regulations that harmonize these taxonomies across different regions and sectors (Ehlers, Gao, and Packer, 2021). European countries seem to have an advantage in green taxonomy implementation and adoption since the EU developed a Sustainability Taxonomy

Regulation. In Asia, various countries have already implemented green taxonomies, while only South Africa and Colombia have effectively implemented them in Africa and Latin America. Figure 18 presents an overview of green taxonomies worldwide.

Figure 18. Overview of Green Taxonomies and Their Various Stages of Development



Source: Thür (2022).

Green taxonomies should be simple, specific, and goal oriented. Ehlers, Gao, and Packer (2021) have suggested principles for designing effective sustainable finance taxonomies. They analyzed green taxonomies in the EU and China and identified weaknesses in their implementation. Table 2 presents five principles for designing effective sustainable finance taxonomies.

Table 2. Principles for the Design of Effective Sustainable Finance Taxonomies

Principle	Description
1. Alignment with high-level policy objectives and measurable interim targets	Green taxonomies should align closely with high-level policy goals related to sustainability and climate action. When policies and taxonomies are well aligned, labeled assets are more likely to contribute to relevant policy objectives.
2. Focus on one single objective (“one taxonomy, one objective”)	Mixing multiple objectives can lead to information loss and reduced information value, creating challenges for investors and potentially enabling greenwashing practices. Taxonomies offer investors more choices and opportunities for specialization within the sustainable investment universe by focusing on one objective.
3. Outcome-based using simple and disclosed key performance indicators (KPIs)	Green taxonomies should have measurable outcomes through simple and disclosed vital performance indicators (KPIs), providing clarity and verification for investors.
4. Incorporation of entity-based information whenever possible	Incorporating entity-based information in taxonomies is critical to discourage greenwashing and ensure that incentives for sustainable investments impact entities at the level where most investment decisions are made.
5. Sufficient granularity, covering both high- and low-sustainability performance	A taxonomy should have sufficient granularity to provide valuable signals for investors, avoiding binary classifications and covering both high- and low-sustainability performers to achieve broader policy goals.

Source: Ehlers, Gao, and Packer (2021).

4.2.6. Insurance

As seen in Section 1, climate-related extreme events are continuously rising in frequency, intensity, and duration, increasing their impacts on human and economic activities. In this context, insurance provides a mechanism for managing and recovering from climate-related losses, helping individuals, businesses, and communities cope with the financial impacts of extreme weather events, natural disasters, and other climate-related risks (Dale, 2022). According to Di Falco et al. (2014), while insurance products and services are likely to increase, it is also possible that certain risks will become uninsurable because there are no underwriters, or the premiums become prohibitively high.

FMs can play a role in developing insurance products that specifically address climate-related risks. They can provide different incentives, influence regulation, and coordinate the private sector to create a dynamic ecosystem for climate change insurance products and services. Furthermore, FMs can facilitate the establishment of risk-sharing mechanisms and insurance pools that spread the financial burden of climate-related risks. By pooling resources from multiple stakeholders, including

governments, insurers, and international organizations, these mechanisms can provide collective coverage for climate risks, ensuring the availability and affordability of climate insurance (Coalition of Finance Ministers for Climate Action, 2023).

Insurance subsidies can serve as a climate change adaptation tool. FMs can provide financial support or subsidies to individuals or businesses that purchase climate insurance policies. By offering incentives such as reduced premiums or tax benefits, FMs can promote insurance adoption as a risk management strategy and increase the resilience of vulnerable populations and sectors to climate change impacts. Farmers and the agricultural sector are among the most vulnerable to climate change due to weather variability. FMs can subsidize farmers to acquire insurance policies that cover crop losses and damages (indemnity insurance), contributing to food security and poverty reduction. Generally, government-subsidized insurance can provide institutional stability, promote equitable access to risk transfer, and contribute to public confidence, although it can also lead to maladaptation (Dale, 2022).

FMs should carefully review their climate change insurance policies with related public entities to avoid undesirable outcomes. Insurance across various sectors serves as a price signal for developing infrastructure, products, and services, but it must be used carefully to prevent maladaptive practices (Dale, 2022).¹³ Providing improper incentives might result in government resources being directed towards recovering from damages rather than avoiding climate change impacts and could encourage behavioral changes that exacerbate risks. Additionally, FMs must consider insurance price signals as valuable information to promote adaptation practices instead of allocating resources to respond to damages caused by natural hazards.

In advanced economies, insurance markets tend to be more competitive without government intervention. However, a temporary governmental subsidy in developing countries is crucial to support the initial adoption of newly introduced insurance products, establish community confidence by ensuring affordability, and maintain pricing stability (Dale, 2022). FMs can allocate funds for climate insurance programs, conduct cost-benefit analyses to assess insurance interventions' effectiveness, and monitor insurance schemes' impact on climate resilience and adaptation.

¹³ Misallocation of insurance resources for vulnerable populations can lead to maladaptation. For instance, high-income residents in areas continuously affected by flooding can afford to pay rising insurance rates instead of relocating to new and safer areas (Dale, 2022).

FMs can also encourage the adoption of parametric insurance, which responds exclusively to catastrophic events. Contrary to indemnity-driven insurance, which covers actual losses incurred, parametric insurance pays out its policyholders based on specific parameters or triggers, such as centimeters of rainfall or days without rainfall. This kind of insurance is much more suited for climate change adaptation due to its lower transaction costs and the flexibility it provides users, besides being more appropriate for countries with low insurance penetration (Dale, 2022). FMs can facilitate the uptake of parametric insurance in areas projected to experience forthcoming droughts or floods by providing specific subsidies. These subsidies would render insurance policies accessible and assist insurance firms in extending coverage to farmers or individuals needing this specialized product (Dale, 2022).

FMs can safeguard their country's resources and assets through insurance and climate emergency funds, avoiding massive resource burdens in case of disasters or extreme weather events impacting their regions. Instead of assuming all risks, FMs can secure insurance coverage to manage substantial disaster-related costs, including payouts to the affected population (Dale, 2022). Collaborating with other states to pool risk on a regional level is another viable strategy. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is an outstanding example of pooled risk insurance. By utilizing CCRIF's parametric insurance coverage, Caribbean countries can enhance their disaster resilience, reduce fiscal strain, and accelerate recovery efforts, thereby safeguarding their economies and communities from the impacts of climate-related events (CCRIF SPC, n.d.). Specifically, FMs can acquire parametric insurance against climate events such as earthquakes, hurricanes, and excess rainfall through emergency funds like CCRIF. Likewise, FMs can lead the effort to encourage countries' participation in this kind of fund by advocating its benefits, coordinating with relevant government departments, assessing financial implications, collaborating with partners, and promoting cross-border risk pooling.

4.2.7. Environmental Tax Reforms

Environmental tax reforms (ETRs) refer to implementing tax policies that address environmental issues and promote sustainable development. These reforms include combining carbon regulation and reducing distortionary taxes (Takeda and Arimura,

2021)).¹⁴ The ETR's main objective is to internalize the costs associated with environmental degradation, encourage more responsible and sustainable environmental behavior among taxpayers, and stimulate the adoption of clean technologies (Borrego and Carreira, 2019).

Implementing ETRs can significantly reduce urban air pollution, improve air quality, and stimulate green technology innovation and industrial structure upgrading (Guo et al., 2022). ETRs lead to economic benefits and technological advancements in heavily polluting industries. Moreover, ETRs have the potential to promote sustainable economic development and improve urban air quality (Guo et al., 2022). Despite the numerous advantages, ETR implementation requires careful consideration of different factors, including the distributional impacts and changes in the optimal tax structure. Moreover, it is essential to ensure that these reforms do not disproportionately burden certain groups or exacerbate existing inequalities (Klenert et al., 2018).

Research has shown that ETRs have effectively reduced GHG emissions and fossil fuel consumption and positively affected GDP. Withana et al. (2013) developed a detailed assessment of carbon and energy taxes in nine advanced countries and concluded that the scheme effectively reduced GHG emissions and fuel consumption in all jurisdictions, while there are notable differences among countries (Withana et al., 2013).

A combination of tax incentives can create a powerful ETR for increasing renewable energy participation. Governments have accelerated and encouraged the adoption of groundbreaking clean technologies through tax incentives. By providing various forms of tax breaks, exemptions, or credits, governments create a favorable economic environment for individuals and businesses to invest in sustainable projects (Song, Jia, and Jiao, 2022). Tax incentives can generate various side benefits for economic purposes such as job creation and stimulus for new technologies and enterprises supporting R&D and attracting foreign investments.

ETRs have evolved from simple excise taxes on specific fuels to more comprehensive approaches such as carbon pricing and ETSs. This evolution has expanded the scope of ETRs, allowing for a wide range of alternatives regarding the

¹⁴ According to the United Kingdom Government (2012), environmental taxes are defined as those that meet all of the following three principles: (i) the tax is explicitly linked to the government's environmental objectives, (ii) the primary objective of the tax is to encourage environmentally positive behavior change, and (iii) the tax is structured in relation to environmental objectives (e.g., the more polluting the behavior, the greater the tax levied).

types of taxes that FMs can implement. These alternatives can include fuel taxes, carbon taxes, energy taxes, waste taxes, pollution taxes, and environmental taxes, among others. The flexibility and variety of ETR options provide policymakers with a toolkit to design and implement effective measures to address climate change and promote sustainable development.

4.2.7.1. Carbon Pricing

Carbon pricing is perhaps one of the most cost-effective mechanisms to promote clean technology investments (IMF, 2012). Establishing a carbon price can create economic incentives for achieving national climate goals while generating government revenues (Coalition of Finance Ministers for Climate Action, 2023). Carbon pricing is not a silver bullet; it needs to be implemented within a series of comprehensive policies to reach mitigation goals.

Carbon taxes and emissions trading systems (ETSs) are generally the two types of carbon pricing schemes. A carbon tax is a charge imposed on the carbon content of fossil fuels and can be implemented either upstream (at the extraction stage) or downstream (at the emissions generation stage). ETSs are applied downstream and target specific carbon-intensive industries (Coalition of Finance Ministers for Climate Action, 2023).

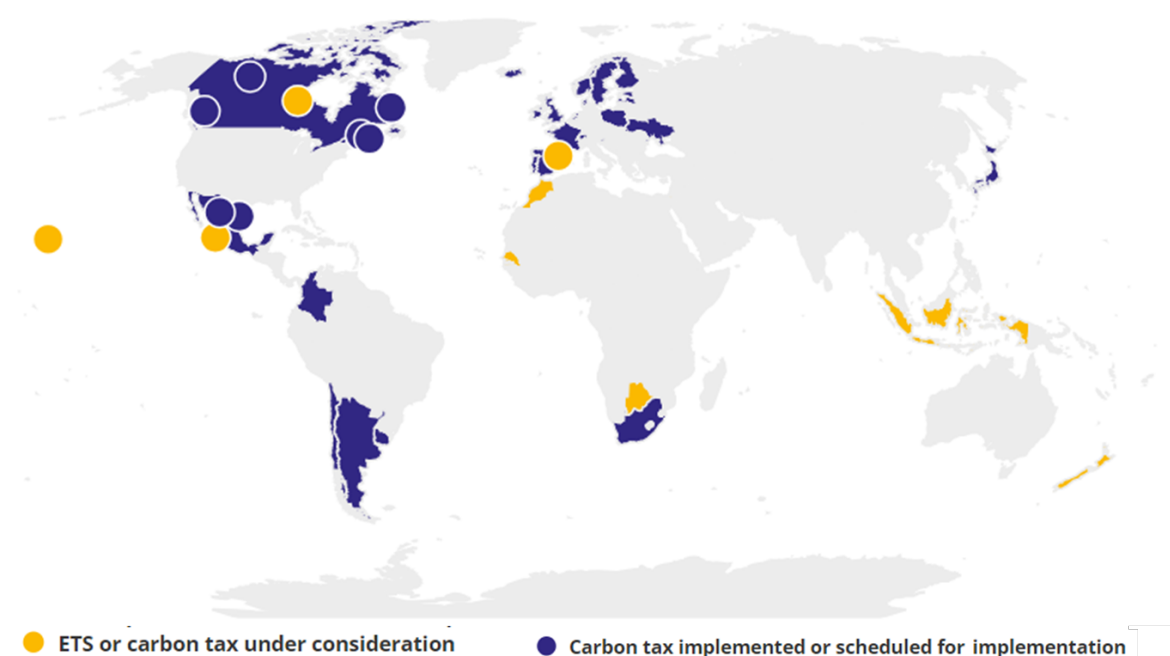
Market-based instruments like carbon prices are potentially one of the most effective policies for reducing energy-related CO₂ emissions (IMF, 2012). Carbon prices effectively reduce economic incentives and demand for fossil fuels, increasing the attractiveness of clean technologies and low- or zero-emitting carbon fuels, like electricity from renewables or hydrogen. Additionally, there should be provisions for refunds or incentives for any carbon sequestration efforts downstream (IMF, 2012). Nonetheless, carbon prices alone are unlikely to achieve desired GHG emissions reduction targets; they must be combined with complementary mechanisms tailored to the specific complexities of each sector. This is especially the case of countries where carbon prices are low.

Generally, the government could use revenues from carbon taxes to support general expenditures or target them toward climate change mitigation and adaptation efforts. Revenues from carbon taxes are frequently used to finance ear-marked government expenditures. It is critical to ensure that policymakers do not use these

additional revenues to provide inefficient subsidies (e.g., on fossil fuels or inefficient energy consumption).

Despite the benefits of carbon taxes, governments have not adopted them worldwide. According to the World Bank (2023b), only 27 countries and 10 subnational jurisdictions have implemented or are considering implementing carbon taxes. Figure 19 presents a map of national and subnational carbon tax initiatives covering 76 gigatons of carbon dioxide equivalent (GtCO₂e), which represents 5.62 percent of global GHG emissions in 2023 (World Bank, 2023b).

Figure 19. Summary Map of National and Subnational Carbon Pricing Initiatives



Source: World Bank (2023b).

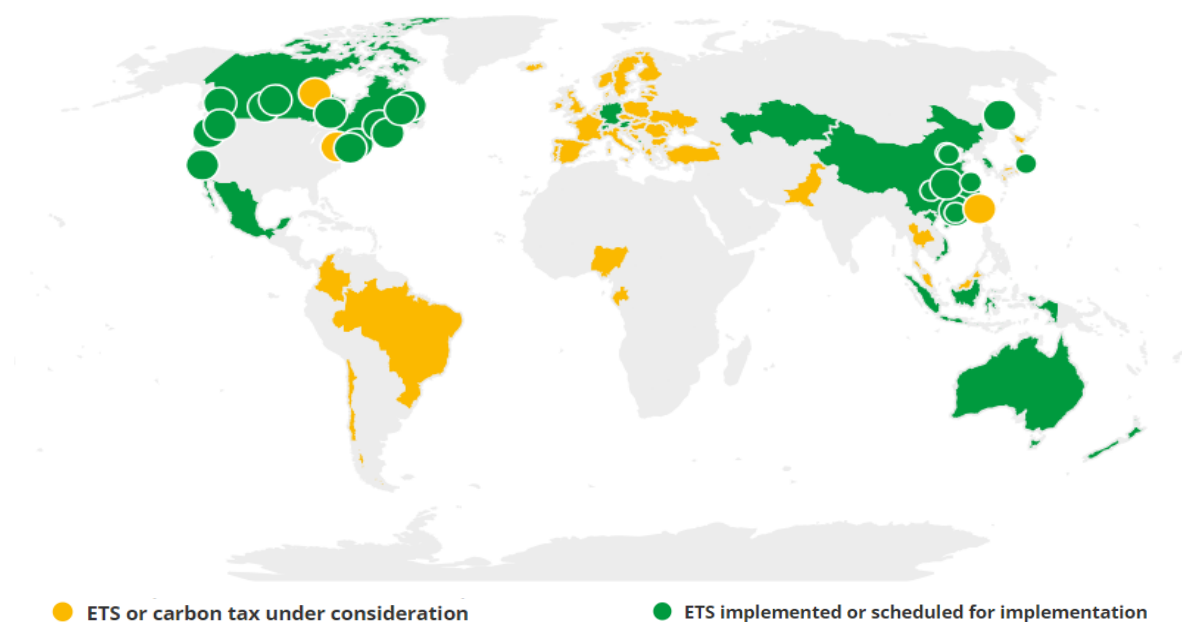
ETSs are also a fiscal measure to reduce GHG emissions. An ETS is a market-based approach that aims to reduce GHG emissions by placing a price on carbon emissions. It sets a cap on the total emissions allowed within a specific jurisdiction and then allocates emission allowances to regulated entities, such as power plants or industrial facilities (European Central Bank, 2023).¹⁵ An ETS generates fiscal revenues by auctioning or

¹⁵ The EU-wide Emissions Trading System (EU ETS), introduced in 2005, was the first ETS. It covers three sectors (energy production, manufacturing and construction, and intra-EU aviation), which account for 40 percent of total GHG emissions in the EU (European Central Bank, 2023).

selling emission allowances. Furthermore, an ETS can have economic implications by incentivizing companies to invest in cleaner technologies and practices.

ETS implementation remains limited. According to the World Bank (2023b), as of 2023, 12 countries and 23 subnational jurisdictions had implemented or were considering ETS implementation. **Error! Reference source not found.** presents the map of national and subnational ETS initiatives, which in 2023 covered 8.91 GtCO₂e, representing 17.64 percent of global GHG emissions (World Bank, 2023b). Together, carbon tax and ETS initiatives (implemented or under consideration) worldwide cover nearly 23 percent of global GHG emissions, highlighting the need for expanding these schemes and accelerating mitigation efforts (World Bank, 2023b).

Figure 20. Summary Map of National and Subnational ETS Initiatives



Source: World Bank (2023b).

4.3. Ensuring Fiscal Management Consistent with Climate Goals

This section explores the third pillar for FMs to drive investments in climate change. It explores strategies such as green budgeting, green tagging, and green procurement to align public expenditure with climate objectives. It also discusses the importance of analytical frameworks, MTFFs, and the role of SOEs in driving emissions reductions and fostering investments in clean technologies.

4.3.1. Green Budgeting, Green Tagging, and Green Procurement

Understanding the impacts of public expenditure on climate change is crucial for driving climate action. Governments need to know whether their current plans and projects on mitigation, adaptation, and risk management are effective. FMs must assess fiscal risks associated with recent government expenditures (Pizarro et al., 2021).

Green budgeting has become one of the most strategic tools to achieve environmental and climate goals. Green budgeting involves a process associated with the development of national climate change plans and goals. It requires FMs to carefully plan their public expenditure on mitigation and adaptation measures rather than evaluating past efforts. Contrary to green tagging, green budgeting refers to “raising, allocating, spending, controlling, and reporting on public resources in ways that drive environmental and climate action, support climate policy commitments, and respond to climate impacts” (Coalition of Finance Ministers for Climate Action, 2022, 12). This practice ensures that FMs use financial resources effectively and efficiently to achieve environmental objectives.

Most importantly, FMs can assess their fiscal policy impact through green budgeting. A complete green budgeting framework can allow FMs to understand their fiscal policies and spending impact, gather relevant information, and help them analyze and reformulate fiscal policies when needed, ensuring that budget and fiscal policy decisions align and are consistent with strategic priorities. The OECD (2020) has identified a series of green budgeting tools that can be used to gather information and assess climate change and environmental objectives (Table 3).

Table 3. Green Budgeting Tools for Evidence Generation and Policy Coherence

Tool	Objective
Green budget tagging	Classifying budget measures according to their environmental and climate impact
Environmental impact assessments	Requiring environmental impact assessments to accompany new budget measures
Ecosystem services, including carbon pricing	Putting a price on environmental externalities, such as GHG emissions, often through taxes and ETs, to facilitate the achievement of national environmental and climate goals
Green perspective in the spending review	Incorporating consideration of the impact of measures on national environmental and climate goals alongside efficiency considerations
Green perspective in goal setting	Integrating performance objectives related to national environmental and climate goals

Source: OECD (2020).

Through green budgeting, governments can facilitate accountability and transparency between climate goals, climate change budgets, and fiscal policies. Green budgeting enables organized and structured spending on green and environmental policies, facilitating tracking and reporting climate-related expenditures. Additionally, this approach allows FMs to identify where further investments or policy adjustments may be required to address climate change goals. Lastly, green budgeting reporting enhances transparency, providing a clear roadmap of the government's climate commitments and performance, increasing investor confidence, and attracting investments from private and multilateral sectors to support ambitious climate initiatives and projects.

Finally, a solid budgetary governance framework will ease green budgeting implementation. A budgetary governance framework refers to the principles and practices that guide the annual budget formulation, oversee its implementation, and ensure it is aligned with public goals (OECD, 2023). It's a practice to ensure that the budget is effectively and efficiently used to achieve the government's objectives, including climate change mitigation and adaptation goals. A modern governance framework develops links between strategic planning and budgeting. It closely engages with policymakers and civil society to constantly improve fiscal policies and redirect investments for climate change requirements.

Although green budgeting is a novel concept, the EU, France, and Austria are successful examples of its implementation. In 2020, the EU published its Green Budgeting Reference Framework for identifying, assessing, and reporting the environmental impacts of government spending and integrating environmental considerations into the budget process. It intends to assist EU member states in aligning their budgetary process to the European Green Deal. Austria conducts yearly assessments to enhance the effectiveness of green spending regarding allocation and operation.¹⁶ France, a leader in green budgeting, conducted two green budget reviews in preparation for its 2021 and 2022 budgets, evaluating regular and tax expenditures based on the EU taxonomy for sustainable activities and their impact on environmental objectives (Eichberger et al., 2023).

Green tagging is considered an additional—and more demanding—tool for evaluating public expenditure on climate change. FMs and other public entities can use green tags or labels to assess expenditures in terms of impact (and not just intent). In contrast to green budgeting, green tagging is a more targeted approach, focusing on individual projects or expenditures rather than the overall budgetary process. Additionally, tagging can enhance transparency and accountability in budget execution by identifying, measuring, and monitoring climate-relevant expenditures. Some FMs have implemented green budget tagging as a step toward impact evaluation in terms of climate goals.

In addition to green budgeting and tagging, FMs should design and align National Public Investment Systems (NPISs) with climate change priorities. These systems, often overseen by FMs, play a crucial role in ensuring that investment projects take climate change considerations into account, including emissions, costs, impacts, and alignment with mitigation and adaptation goals. They also ensure that project designs incorporate measures to address new climate risks. During the investment prioritization stage, it is essential to carefully analyze alignment with national and/or sectoral plans. This alignment ensures that investments contribute to broader sustainability goals outlined in these plans. By integrating climate considerations into project evaluations and prioritization processes, FMs can bolster the resilience of

¹⁶ A review conducted in 2022 revealed that approximately 11.4 percent of expenditures and 11.5 percent of revenues align with Austria's climate, energy, and environmental goals, as specified by the country's national green public finance taxonomy (Eichberger et al., 2023).

infrastructure and promote sustainable development pathways. Moreover, assessing alignment with national and sectoral plans helps ensure that investments strategically target priority areas identified at the national level. Therefore, robust NPISs are indispensable for fostering climate-conscious decision-making and facilitating the effective allocation of resources to mitigate climate change risks and advance sustainable development agendas.

Green public procurement complements and enhances efforts of green budgeting and NPISs. Green public procurement refers to incorporating environmental and sustainability considerations into the procurement process of public entities (Alhola et al., 2018). It involves selecting and purchasing goods and services with reduced environmental impact, promoting resource efficiency, and supporting SDGs. Through green public procurement, governments can target initiatives such as procuring energy-efficient appliances, sustainable construction and infrastructure, renewable energy procurement, sustainable transportation, sustainable food production, and waste management and recycling (Alhola et al., 2018). Moreover, it is often noted that due to the substantial scale of public sector procurement, adopting green procurement practices can stimulate the development and expansion of green businesses, thereby encouraging similar practices within the private sector. The implementation of these types of policies directly fosters the growth of green companies that supply goods and services to the state, thereby strengthening the green economy and promoting sustainability.

4.3.2. Analytical Frameworks and Capabilities

FMs require analytical frameworks and capabilities to allocate and mobilize climate finance resources effectively. FMs will develop and implement diverse mechanisms to increase climate change and environmental financing. However, they will also require robust analytical frameworks and capabilities to track, monitor, assess, and improve how resources are being invested. These processes will allow FMs and other public stakeholders to understand climate finance flows, identify financing gaps, and address other related issues and challenges.

Analytical capabilities will allow FMs to assess the effectiveness and impact of climate finance interventions. With comprehensive information about climate finance flows and investments along different sectors and regions, FMs can perform impact

evaluations on related climate and environmental interventions, projects, and programs. By analyzing the outcomes and impacts of climate finance interventions, FMs can identify successful approaches, best practices, and areas for improvement. This information can inform future decision-making and help optimize the allocation of climate finance resources (Pickering et al., 2015).

Strong analytical frameworks and capabilities over climate finance resources increase bilateral and multilateral climate finance flows. Since 2009, advanced countries have increased their climate finance flows toward emerging and developing countries to mitigate their increasing GHG emissions. In this regard, advanced economies and multilateral agencies are more likely to increase financing to countries that monitor, assess, and continuously enhance their climate finance investments. Information sharing and collaboration, led by FMs, is expected to improve climate finance allocation processes and integration from contributors as to how to implement climate finance (Pickering et al., 2015).

Improved budget processes can drive climate change transformation and new investment across all sectors of the economy. The FM is responsible for leading budget process construction and execution, ensuring that national development plans and strategies guide budgetary decisions. During this process, FMs are responsible for ensuring that fiscal policies are aligned with broader climate and environmental objectives in national development plans so that financial resources are effectively directed towards initiatives that promote sustainability, resilience, and low-carbon solutions.

MTFFs are crucial to improving climate-related expenditures. MTFFs are a structured fiscal planning and budgeting approach covering 3-10 years.¹⁷ Frameworks aid fiscal management and decision-making by providing a medium-term perspective on revenue, expenditure, and fiscal targets. Additionally, they offer a platform for integrating climate-related expenditures into the budgetary process, allowing governments to prioritize climate action and allocate resources more effectively by explicitly considering climate-related investments in their medium-term fiscal plans (Schwartz and Beuermann, 2021).

¹⁷ MTFFs have been adopted worldwide, and research indicates that their implementation enhances fiscal balances, reduces expenditure volatility, and boosts public spending in areas related to human capital development (Schwartz and Beuermann, 2021).

MTFFs provide advantages for driving climate action. MTFFs can aid climate change financing in several ways. First, MTFFs contribute to fiscal discipline and stability, essential for attracting bilateral, multilateral, and private climate finance flows (Schwartz and Beuermann, 2021). They create a favorable environment for investors by setting clear fiscal targets and rules while ensuring long-term financing for climate change initiatives. Second, MTFFs enable the mobilization of climate finance by creating a stable and predictable fiscal environment, offering clear medium-term expenditure plans and revenue projections; governments provide certainty to investors and financial institutions, facilitating planning and financing for climate-related projects (Schwartz and Beuermann, 2021). These frameworks can support the development of innovative financing mechanisms for climate change as they can rely on the use of public-private partnerships, green bonds, and other financial instruments to leverage private-sector investments and mobilize climate finance (Schwartz and Beuermann, 2021).

Climate change is a central component of the budget and other fiscal instruments. To enhance the effectiveness of MTFFs, fiscal rules, and debt sustainability analysis, FM should consider the macro-fiscal impacts of climate change and related risks. Through a climate-informed fiscal risk assessment, governments can evaluate the financial threats climate change poses on the government's fiscal stance, encompassing potential effects on revenue, expenditure, and government-held assets and reserves (Coalition of Finance Ministers for Climate Action, 2022). To address these challenges, FM can establish a comprehensive framework that prioritizes risk management, including risk reduction, risk retention, and risk transfer, while considering budget limitations.

4.3.3. State-Owned Enterprises

SOEs, especially in extractive industries, can be decisive for emissions reductions. SOEs are significant players in several of the globe's largest economies, notably in electricity generation, oil and gas, and heavy industries. In this regard, SOEs (i.e., entities in which a government holds 50 percent or more of the voting shares) are also a significant source of GHG emissions.¹⁸ FM can use their shareholder position to implement climate change strategies in SOEs.

¹⁸ The number of SOEs worldwide is estimated to be more than 100,000. SOEs are responsible for at least 7.49 GtCO₂e annually in Scope 1 (direct) emissions (Clark and Benoit, 2022).

SOEs are vital for implementing climate change strategies and initiatives. Governments' direct control over these entities can have significant advantages when implementing climate change mitigation strategies and driving substantial investments. Governments can leverage their ownership to implement stricter environmental standards, impose emission reduction targets, and invest in cleaner technologies. As major shareholders, governments can drive sustainable practices within SOEs, influencing their operational decisions and long-term strategies to align with climate goals. In fact, many SOEs have plans to considerably reduce their carbon emissions and achieve carbon neutrality in the long term (Clark and Benoit, 2022). In this sense, SOEs become a strategic point for implementing mitigation and environmental regulation, projects, and policies.

Environmental standards can be set and enforced in SOEs. Governments can analyze, design, and implement SOEs' emissions reduction standards and goals. Assessing policies' effectiveness, analyzing their impact, and reducing GHG emissions are among the advantages of implementing more stringent environmental regulations and compliance requirements in SOEs. This could be part of a comprehensive global climate change program led or accompanied by FMs that can include emission reduction targets, pollution control measures, and sustainable practices in their operations (Yu and Tsai, 2018). For instance, the Norwegian government has utilized its ownership of Equinor (formerly Statoil), the Norwegian oil and gas company, to set ambitious targets for reducing GHG emissions (Nissen, 2021).

FMs can drive investments in clean technologies through SOEs. SOEs can prioritize investments in clean technologies and renewable energy sources to reduce their carbon footprint and accelerate energy transition processes. This strategy becomes even more relevant in countries where SOEs in the oil, gas, and extractive industries represent significant fiscal revenues. SOEs should play a crucial role in diversifying their economic activities with renewable energies and energy efficiency, reducing their dependence on extractive industries while reducing GHG emissions. For instance, Ecopetrol, the Colombian state-owned oil and gas company, is currently implementing an energy transition strategy by diversifying its energy portfolio and gradually expanding its investments in renewable energy sources such as solar, wind, hydrogen, bioenergy, and energy transmission (Ecopetrol, 2021b).

SOEs can also drive R&D investments and policies. Climate change mitigation technologies, policies, and projects still require significant investments in R&D. Some technologies are still in early stages of development and are not affordable and accessible to all stakeholders. SOEs can allocate resources to R&D efforts focused on developing and implementing innovative technologies that reduce emissions, accelerating the deployment of climate change mitigation technologies. This can include renewable energy technologies, energy-efficient solutions, carbon capture and storage, and sustainable transportation systems (OECD, 2022).

Collaboration and partnerships are another critical pillar through which SOEs develop and promote climate change solutions. SOEs can use their resources and expertise to conduct pilot projects and demonstrations of climate change solutions. These projects can help test and validate new technologies, policies, and practices before scaling them up for broader implementation (OECD, 2022). Additionally, SOEs can collaborate with other stakeholders, including government agencies, private companies, and research institutions, to develop and implement emission reduction strategies. This can involve sharing best practices, knowledge exchange, and joint initiatives to address climate change challenges.

SOEs can enhance transparency and reporting on their environmental performance. SOEs can adopt established environmental reporting frameworks, such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB), to structure and disclose their environmental performance data. These frameworks provide guidelines for reporting various environmental indicators, including GHG emissions, energy consumption, and waste management. Through the adoption of these standards, FMs can work with other public entities to assess new policies or programs, gather additional information, and set environmental performance targets that could eventually lead to the design and implementation of other fiscal policies such as carbon pricing, energy efficiency markets, subsidies, and budget allocation for climate change initiatives.

5. Assessing Climate Action in Latin America and the Caribbean: Implementation Status and Challenges

As discussed, LAC countries have a considerable gap in climate finance resources to address climate change needs and projects. Despite increasing climate finance flows, the financial gap continues to increase due to the growing demand for mitigation and adaptation projects. As greenhouse gas (GHG) emissions rise, additional public, multilateral, and private efforts will be needed to face daunting climate conditions and extreme weather events.

The previous section discussed the wide range of tools and strategies available for LAC's finance ministries (FMs) to address climate change, create a dynamic and secure ecosystem for climate change investments, and lead the development, implementation, and improvement of climate-related policies. This chapter discusses the implementation of green fiscal policy tools to incentivize climate investments, aiming to identify gaps in execution and policy enactment across the LAC region.

This assessment begins with an overview of green fiscal policy implementation in LAC as well as pending actions and opportunities. The analysis focused on the six largest economies: Brazil, Mexico, Argentina, Colombia, Chile, and Peru. These economies offer a general overview of the current state of climate action policy implementation in LAC.

5.1. Progress and Challenges in Green Fiscal Policies across LAC

FMs have been critical in managing and evaluating public spending, budgeting, and mobilizing private and international resources for climate action. Moreover, FMs have strengthened inter-institutional coordination mechanisms for implementing mitigation and adaptation projects. These are now crucial pillars to achieve sustainable economic growth.

FMs in LAC still face significant challenges in implementing a comprehensive green fiscal framework. Countries in LAC are failing to structure robust and long-term plans and financing strategies for their nationally determined contributions (NDCs) and other climate commitments. Calero et al. (2020) examined NDC implementation among 21 LAC countries and concluded that only five had long-term climate change plans, and four had developed strategies for financing their commitments under the Paris Agreement. Countries in LAC are lagging in identifying and quantifying their required investments in mitigation and adaptation, and, more importantly, they are

facing challenges in structuring specific strategies and financing those critical needs. Coordinating multiple entities to develop long-term climate change plans, committing to sustainable finance reform, and creating more effective incentives for public and private clean investment should be a key priority of FMs in LAC.

COVID-19 economic stimulus packages in LAC did not prioritize climate change considerations. The green and climate change perspectives of recovery programs in LAC varied across countries, only exceptionally incorporating sustainability measures such as renewable energy incentives. The majority of countries focused primarily on immediate economic response without specific environmental considerations. Colombia's green recovery package included support for nature-based solutions, reforestation, and conservation, including a tree-planting program and initiatives for ecosystem preservation (Green Economy Coalition, n.d.). Despite decarbonization pledges, Argentina's recovery plan prioritized fossil fuels by allocating more funds to the sector, supporting domestic oil producers, freezing internal taxes, and subsidizing natural gas exploration and production (Green Economy Coalition, n.d.). New economic stimulus packages will require careful consideration of transition policies to gradually decrease support for high-emitting technologies and fuels without facing social and economic disturbances.

Although green budgeting is one of the most valuable tools to track and enhance climate change investments, few countries in LAC have been implementing this type of mechanism. Improving the quality of current budgetary spending can increase efficiency, effectiveness, and equitable results aligned with national climate goals. Yet, few countries in LAC are keeping track of their climate change expenditure, leading to poor decision-making by FMs. Delgado, Eguino, and Lopes (2021) report that between 2008 and 2018 only 14 countries across LAC either had undertaken or were implementing legal and/or regulatory frameworks that established goals aligned with the NDCs to monitor and assess public expenditure on climate change. In addition, only Colombia and Peru have medium-term fiscal frameworks (MTFFs), including climate change perspectives. In this regard, FMs in LAC will require additional technical support to adopt practices aligned with international standards and coordinate regional efforts to enhance information access to all stakeholders.

Countries in LAC continue to subsidize fossil fuels. In 2022, governments in LAC provided fossil fuel subsidies equivalent to 0.57 percent of GDP, adding up to nearly

US\$0.5 trillion (Conte-Grand, Rasteletti, and Muñoz, 2022). FMs in LAC should target subsidies toward the poorest households while creating strong price signals toward decarbonization and energy transition (Delgado, Eguino, and Lopes, 2021). Some countries in LAC, such as Colombia, are beginning to reduce fossil fuel subsidies. However, others—such as Brazil, Mexico, and Argentina—continue heavily subsidizing them, sending the wrong economic signals regarding climate change mitigation requirements.

Renewable energy subsidies and tax incentives have considerably increased LAC's renewable energy share. Countries in LAC have continuously deployed renewable energy fiscal incentives to increase their renewable energy share. According to the International Renewable Energy Agency (IRENA, 2022), of the 33 LAC countries, 22 have renewable energy targets, 20 have net-zero targets in the long term, 24 have renewable energy policies in place, and 320 cities have net-zero emission targets. Moreover, from 2015 to 2020, the LAC region increased its renewable energy capacity by 33 percent (Yépez, 2022). Argentina, Brazil, Chile, Colombia, Mexico, and Peru have developed renewable energy auctions, making LAC one of the most dynamic renewable energy markets worldwide (World Bank, 2021). Although these strategies and policies have proven effective in the region, FMs will require additional and coordinated economic strategies to achieve the necessary investments to mitigate climate change.

Countries across LAC have implemented successful insurance and disaster risk management (DRM) practices, yet there is a need for their expansion and enhancement. Delgado, Eguino, and Lopes (2021) analyzed DRM practices in 26 countries from the region and the results were striking. Only 38 percent have implemented a budget classifier to identify investments in DRM, 27 percent have resources for investments in climate change adaptation, and only 42 percent have funds for investments in DRM (Delgado, Eguino, and Lopes, 2021). Furthermore, in only 38 percent of countries have FMs assessed the resources needed to cover maximum probable losses for catastrophic events, and only 27 percent of FMs in LAC have estimated losses generated by frequent events (Delgado, Eguino, and Lopes, 2021). Finally, 50 percent of the analyzed countries have regulations that mandate conducting a disaster risk analysis during the pre-investment phase of the project cycle. LAC still has considerable room to improve its insurance and DRM governance and policies; additional integration and technical cooperation could enhance this component.

Carbon pricing mechanisms remain scarce in LAC. Carbon pricing is perhaps one of the most effective mechanisms to reduce GHG emissions while generating additional revenues for governments to finance different climate change projects (IMF, 2012). As of this writing, only Argentina, Chile, Colombia, and Mexico have implemented carbon taxes. Mexico adopted an emissions trading system (ETS) while Brazil, Chile, and Colombia are considering it. Prices of carbon vary between US\$3 and US\$5, except in Uruguay, which has a carbon tax of US\$155 (World Bank, 2023b).¹⁹ LAC's effective carbon rates on energy use priced at an average of 24 euros per ton of CO₂ equivalent emissions (EUR/tCO₂e) are low compared to OECD countries where the average price is nearly 41 EUR/tCO₂e (Ahumada et al., 2023). These prices are also significantly low considering that the High-Level Commission on Carbon Prices (HLCCP)²⁰ recommends that countries should implement a carbon tax of at least "USD 40 to USD 80 per ton of CO₂ by 2020 and USD 50 to USD 100 per ton of CO₂ by 2030" to achieve Paris Agreement objectives (Delgado, Eguino, and Lopes, 2021). Moreover, regional coordination regarding carbon prices is not viable at this point, given the diverse economic conditions in the region. Despite likely trade implications associated with the lack of coordination (say, vis-à-vis Europe), countries in LAC need to implement their own customized carbon pricing mechanisms before considering regional integration.

Green taxonomies, a key mechanism to drive sustainable investments, remain insufficient across LAC. Only Argentina, Colombia, and Mexico have implemented green taxonomies to drive investment toward sustainable initiatives and projects. Brazil, Chile, and Peru have roadmaps and ongoing processes to design and implement green taxonomies. In this regard, FMs must embrace the responsibility to coordinate with other related entities and define their taxonomies. Political support will also be crucial to encourage the development of this and other associated mechanisms.

The thematic bond market in LAC is rising. Among countries in LAC, 14 have issued sustainable bonds, 12 countries have green bonds, 10 have social bonds, 9 have sustainable bonds, and 2 have green, social, and sustainability (GSS) bonds (Climate

¹⁹ Uruguay has established the world's highest carbon tax price, although it only covers a small portion of its emissions (around 11 percent) and is intended to accelerate the transition in industry, heat, and transportation, as Uruguay's power matrix is already highly renewable.

²⁰ The HLCCP is an initiative launched by the World Bank Group in collaboration with the United Nations Framework Convention on Climate Change (UNFCCC). It advocates for carbon pricing mechanisms like carbon taxes to combat climate change.

Bonds Initiative, 2021a). Chile, Brazil, and Mexico lead the GSS bond market in LAC. The rise of social and sustainable labels indicates broader regional potential, supported by strong participation in local currencies. This reflects the consolidation and diversification of national bond markets in LAC (Climate Bonds Initiative, 2021a).

Nonetheless, the share of sovereign thematic bonds in emerging markets and developing economies (EMDEs) remains low compared to the global market. The common issuance of thematic bonds in EMDEs compared to the worldwide share can be attributed to the institutional complexity of setting up green bond frameworks and the lack of development and liquidity of domestic debt markets (Jain, 2022). Costs associated with external reviews and certifications for thematic bonds are still high (Jain, 2022). These impediments limit the ability of national governments in LAC to issue thematic bonds despite the potential benefits they offer. However, Chile and Uruguay have sovereign sustainability-linked bonds (SLBs, which are linked to climate targets) and are world leaders in this class (Mexico issued a bond linked to the UN's Sustainable Development Goals [SDGs], which was innovative although not directly related to climate).

Multilateral development banks (MDBs) have played a significant role in LAC by providing financial resources, technical expertise, and policy guidance to support sustainable development projects and initiatives. Multilateral development funds such as the Green Climate Fund and the Clean Technology Fund have contributed considerably to sustainable project development in LAC, mobilizing US\$6.3 billion in 2022 (Climate Funds Update, 2022). Although advances and support to countries in LAC are remarkable, only a handful receive financial and technical assistance. Extending support to smaller regional economies will depend on the countries' willingness to design and implement sustainable and climate change policies.

5.2. Implemented Policies and Measures across LAC's Six Largest Economies

Assessing the implementation of various fiscal interventions across the six largest economies in LAC is not a simple task because the analysis would require very granular information. Looking at the general status of eight key policies and tools—utilizing a scale ranging from policies not yet implemented to those fully implemented across multiple sectors—provides some interesting insights. This analysis indicates relevant differences in the countries' progress toward addressing climate change through fiscal measures. For

a detailed assessment of each country's implementation status for all evaluated policies, see Appendix B.

Brazil has followed a mixed approach to allocating budgetary resources for climate action. While it has taken some steps to encourage green investments through tax incentives, it has yet to impose explicit carbon pricing, instead relying on state-level fuel excise taxes. Efforts to establish an ETS are underway, signaling progress in this regard. Brazil has the largest green bond market in Latin America, with substantial private sector issuance, and public financial and government-backed entities have been increasing their participation in the market. However, sovereign thematic bonds have not been introduced. Unfortunately, Brazil lacks a sustainable finance taxonomy and lags in implementing analytical frameworks and capabilities for comprehensive green fiscal policies.

Mexico has tried to address environmental sustainability in its fiscal and monetary policies by establishing institutions like the National Council for the Promotion of Investment, Employment, and Economic Growth (COFINECE) and the Green Finance Advisory Board (CCFV). However, significant fossil fuel subsidies persist, suggesting the need for a more comprehensive approach. Mexico supports renewable energy through tax incentives and environmental regulations but needs more extensive fiscal measures for climate actions beyond the energy sector. In January 2020, Mexico pioneered the first ETS in Latin America to control CO₂ emissions from primary fixed sources in the energy and industry sectors. This groundbreaking initiative covers a substantial portion of the nation's GHG emissions and is closely linked to the National Emissions Registry. Mexico's FM has also ventured into thematic sovereign bonds, demonstrating its commitment to sustainable finance. In March 2023, Mexico introduced its Sustainable Taxonomy, which covers various industries and emphasizes environmental and social concerns. Furthermore, Mexico has proactively promoted climate change financial risk reporting, enhanced environmental, social, and governance (ESG) reporting, and established investment and risk measurement frameworks.

Argentina faces substantial challenges in embracing comprehensive green fiscal policies because it maintains significant support for fossil fuels. Although the country has encouraged renewable energy through incentives and implemented a carbon tax on liquid fuels and specific solid products with gradual rate increases through 2028, there is still a pressing need for a more holistic fiscal approach to address climate

concerns effectively. Notably, Argentina's Central Bank ranks at the bottom among G20 nations in terms of adopting green policies. While the country hasn't issued sovereign green bonds, several regional entities and cities have begun to do so. Furthermore, the Ministry of Economy in Argentina has officially embraced the National Sustainable Finance Strategy, signaling the importance of the nation implementing environmentally responsible financial practices.

Colombia's green fiscal policies focus on green growth, with limited emphasis on reducing fossil fuel consumption despite the fact that it has implemented carbon taxes and is piloting ETSs. In 2018, Colombia enacted a climate change law establishing an ETS that remains unimplemented (following the 2016 adoption of a carbon tax). However, diesel subsidies remain a concern. The country has taken steps to encourage renewable energy investments through tax incentives and subsidies, but further measures are needed to address diverse climate requirements. The country made significant strides by issuing its first local-currency sovereign green bonds and adopting the Framework of Reference for Colombia's Sovereign Green, Social, and Sustainable Bonds in 2022. Additionally, the FM introduced a green taxonomy in 2022, further emphasizing its commitment to sustainable financing. Since 2004, Colombia has been publishing its MTFF, with a noteworthy shift toward considering energy transition and climate change perspectives since 2020.

Chile's FM actively shapes green fiscal policies through taxes, subsidies, and incentives to combat climate change, as demonstrated by the 2022 Climate Change Framework Law. The adoption in 2014 of green taxes on emissions and the carbon tax in 2017 underscore their commitment. Chile issued US\$2.4 billion in sovereign green bonds in 2019, a first in the Americas. While a green taxonomy is pending, in 2021 the ministry published a roadmap for development to boost green investments. Efforts by the Superintendency of Securities and Insurance enhance ESG transparency, and a collaboration with the United Nations Development Programme (UNDP) aims to measure public expenditure on climate change.

Peru's fiscal policies aim to discourage fossil fuel consumption through excise taxes, offering incentives for renewable energy investment and supporting sustainability, economic growth, and biodiversity conservation. However, the country continues to maintain significant fossil fuel subsidies. The allocation of budgetary resources for climate actions is evident in its tax measures, subsidies for green projects, and efforts to

promote renewable energy. The nation's green fiscal policy is evolving, focusing on promoting environmental protection and sustainable development. In 2021, Peru issued its first sovereign bonds. While lacking a green taxonomy, Peru is developing an eco-friendly financial classification system. Sustainable finance regulations mandate financial entities' social and environmental risk reporting yet fall short on governance and ESG aspects. Peru's Multiannual Macroeconomic Framework aims for responsible fiscal management but requires a more extensive analysis of climate financing and critical minerals in its economic outlook.

5.3. A Roadmap for Action

Building upon the analysis of climate policy implementation in LAC, this section suggests a number of actionable strategies spanning short-, medium-, and long-term horizons. Figur presents the roadmap of fiscal measures and functions to be adopted by FMs in LAC. Actual implementation of these strategies will vary depending on each country's FM capabilities and overall progress in coordination with other ministries and entities. It's important to note that the proposed roadmap serves as an initial suggestion or approximation of what FMs could consider implementing across different timeframes.

In the short term, FMs should lead the analysis, design, implementation, and evaluation of national climate change plans and strategies. This could provide the necessary insights and assistance to ensure that required financial resources are available for the desired programs and projects while constantly reviewing how fiscal policies might be adjusted to reach outcomes. FMs in LAC lack considerable experience in green budgeting and should begin implementing green budget tagging in the medium term. This will provide FMs with the required information to adjust fiscal policies to climate goals. Additionally, FMs should consider providing and acquiring financial insurance to recover from natural hazard impacts, seeking to protect the already scarce resources to address these events (in the fashion of the Caribbean Catastrophe Risk Insurance Facility [CCRIF]).

In the short term, FMs should prioritize medium-term fiscal frameworks (MTFFs) that align fiscal policies and financing with climate change mitigation and adaptation plans and strategies. Through implementing MTFFs, FMs will increase financial flows to climate change needs while creating stability and improving planning for the required

investments. Moreover, multi-year budgetary commitments would be fundamental to attract private investment. Decreasing fossil fuel subsidies will be strategic but, at the same time, challenging. Phasing out subsidies in the short term without increasing economic assistance to vulnerable populations is politically very difficult. FMs must implement mechanisms to support low-income families, such as cash transfers or social tariffs. It is critical for governments in LAC to consider eliminating fossil fuel subsidies and providing subsidies for green energy, all these in a medium-term perspective.

Furthermore, carbon pricing would encourage behavioral changes and the adoption of new technologies. Note that subsidies for green energy are often an ineffective substitute for carbon taxes, but they are easier to adopt politically. Implementing carbon pricing depends heavily on the political and economic circumstances of a country—there may be concerns about potential social unrest in response to such measures—and it may seem less risky to deploy renewable energy subsidies. While implementing carbon pricing strategies seems daunting, FMs could promote the use of shadow carbon prices in the budget and the investment decisions by state-owned enterprises (SOEs). Robust SOEs often possess the autonomy, resources, and capabilities to undertake climate change initiatives that extend beyond the limitations of national budgets. Comprehensive frameworks for evaluating projects' environmental and social impacts will lead to meaningful impact on political decision-making and avoid investments that do not align with national climate plans.

Influencing the design of regulation will be crucial for FMs. It is their responsibility to create a dynamic but safe financial ecosystem for the private sector to deploy climate change projects and initiatives. Increasing financing through thematic bonds is another untapped opportunity. Green taxonomies will be crucial for this purpose, as they will set the standards for acknowledging which investments will be considered green or sustainable, driving more interest in private and multilateral sectors to participate in the market and access fiscal incentives and subsidies.

Figure 21. Implementation Roadmap for Climate Change Fiscal Measures and Functions for FMs in LAC

Initiatives	Short Term 1–3 years	Medium Term 3–5 years	Long Term 5–8 years
Participating in national climate change strategies	←→		
Carbon tax	←→		
Public resources insurance coverage	←→		
Influence in the design of regulation		←→	
Renewable energy subsidies	←→		
Medium-term fiscal frameworks	←→		
Removing fossil fuel subsidies	←→	←→	←→
Insurance subsidies	←→	←→	
Green budgeting	←→		
Green tagging		←→	
Environmental tax reforms		←→	←→
Analytical capabilities for climate change		←→	←→
Green taxonomy	←→		
Parametric insurance		←→	
SOEs' climate change strategies	←→	←→	←→
Emissions trading system		←→	←→

Source: Authors' elaboration.

6. Conclusions and Recommendations

The LAC region faces significant vulnerability to the impacts of climate change. Several factors drive this vulnerability, including geographic location, limited capacity to adapt to climate change, a fragile commodity-based economy susceptible to weather-related disruptions, and the increasing frequency, intensity, and duration of those events. As global emissions and average temperatures continue to rise, impacts on the region's economy, infrastructure, ecosystems, and human well-being become more dire. According to different sources and calculations, the region is investing between 15 and 31 percent of what is estimated to be necessary for mitigation and just an average of 7 percent of adaptation requirements. Finance ministries (FMs) face considerable challenges to significantly increase climate investment.

In addition, climate mitigation investments are 10 times greater than investments in adaptation. FMs must engage in a decisive way to close this additional gap. FMs play a pivotal role in advocating for intergovernmental coordination and facilitating investments by subnational governments to boost both mitigation and adaptation efforts. Nevertheless, it's imperative for FMs to recognize the emerging opportunities and dilemmas inherent in this dynamic. Adopting a comprehensive approach to allocate budgetary resources to projects with synergies between adaptation and mitigation is essential. This strategy not only catalyzes private investment but also provides co-benefits such as employment and GDP growth. Recognizing the challenges faced by private sector investments in adaptation projects, including the complexity of quantifying long-term benefits and the lack of immediate returns, underscores the critical role of FMs. In addition to addressing the tensions between mitigation and adaptation objectives, FMs need to strike the balance between private and public investment.

However, estimation of investment needs for mitigation and adaptation in LAC varies significantly across different sources, highlighting the challenges in accurately assessing these requirements. Figures range from US\$21 billion to US\$885 billion per year, reflecting the substantial disparity driven primarily by the varying scopes and methodologies, including sector coverage, emissions reduction scenarios, and assumptions about carbon prices. FMs should lead thorough studies to estimate financial and investment needs accurately in partnership with environment and energy

ministries. Only with precise estimates can the required capital, policies, incentives, and strategies be deployed effectively to address climate change challenges in LAC.

FMs must actively engage in the creation of national climate change strategies to ensure fiscal viability and efficient resource allocation. Beyond mere cost estimation, FMs in LAC countries should craft comprehensive investment plans for mitigation and adaptation, leveraging their strategic role in tax and expenditure decision-making. Their involvement should extend to discussions on fiscal feasibility, ensuring alignment with proposed strategies. In LAC, only a small fraction of countries has developed long-term climate plans, highlighting the urgent need for comprehensive green fiscal frameworks in which FMs will have a key role.

In addition, FMs can increase public and private financial flows to meet the climate change needs with non-budgetary instruments. Tax policy, financial regulation, SOE actions, and the opportunities associated with the use of thematic bonds and multilateral development bank (MDB) financing are essential to the toolbox. There's room for them to enhance further the FM's leadership, collaboration, and vision. Nonetheless, FMs in LAC must promptly develop and implement green taxonomies to guide sustainable finance decisions effectively, given that only Argentina, Colombia, and Mexico have implemented them. Collaboration with regional and international partners is essential to establish clear guidelines, ensuring harmonization across LAC countries and sectors. This will accelerate adoption and maximize the impact of green taxonomies in driving sustainable investments regionally.

Fossil fuel subsidies remain large in LAC, totaling 0.9 percent of GDP in 2022. Urging FMs to redirect subsidies towards the most vulnerable while establishing strong pricing signals for decarbonization is a key step. FMs must lead the charge in implementing comprehensive subsidy reforms to effectively mitigate carbon emissions while ensuring equitable access to clean energy sources. This includes gradually reducing polluting fuel use, depoliticizing energy pricing, and redirecting subsidies towards renewable investments. Additionally, FMs should prioritize protecting low-income families through targeted cash transfers as part of subsidy reforms. For renewable energy subsidies, FMs should carefully assess the necessity and effectiveness of these subsidies before implementation. Direct funding allocation, price control mechanisms like feed-in tariffs, and technology-specific policies are effective tools to incentivize renewable energy deployment. Governments must ensure a balanced

approach, leveraging financial incentives and mandatory allocation mechanisms to drive innovation and investment in clean technologies.

Carbon pricing mechanisms remain underutilized in LAC, with only a few countries having implemented carbon taxes or emissions trading systems (ETs). These tools are crucial for reducing greenhouse gas (GHG) emissions and generating revenue for climate projects. However, current pricing levels are below recommended thresholds, indicating the need for more ambitious action. Additionally, environmental tax reforms (ETRs) offer a comprehensive approach to addressing environmental issues and promoting sustainable development, but careful consideration of distributional impacts is necessary. Expanding carbon pricing initiatives and implementing ETRs are essential steps for LAC countries to achieve climate goals and foster sustainable growth. FMs must prioritize the implementation of carbon pricing mechanisms and ETRs, which are crucial for reducing GHG emissions and generating additional revenues for climate change and energy transition projects.

The thematic bond market in LAC is growing, with several countries issuing green, social, and sustainability (GSS) bonds and sustainability-linked bonds (SLBs), but this remains an untapped opportunity compared to the global trends. FMs in LAC countries should focus on streamlining issuance processes and reducing costs to leverage the potential of thematic bonds for financing climate and social initiatives.

While FMs have a crucial role to play in strengthening the investment ecosystem in their respective countries, the relevance of other ministries and entities in this effort cannot be underestimated. Strategies and plans must be mutually agreed upon, diligently implemented, and subject to constant evaluation. While FMs typically rein in allocating resources and controlling the budget, line ministries often retain significant autonomy in resource execution. In light of this, developing highly detailed green budgets is a critical step. This entails the pursuit of meticulously itemized project-level budgets, and increased oversight by the FM to ensure the execution of investments as intended. LAC still grapples with substantial gaps in directing finance towards climate change and implementing fiscal policies to address these challenges. FMs have a vital opportunity to synchronize these efforts across entities and ministries, promoting sustainable development in the long term.

References

- Abu-Rumman, G., A. Khdair, and S. I. Khdair. 2020. Current Status and Future Investment Potential in Renewable Energy in Jordan: An Overview. *Heliyon* 2(6). Available at <https://doi.org/10.1016/j.heliyon.2020.e03346>.
- Adhikari, B., and L. S. S. Chalkasra. 2021. Mobilizing Private Sector Investment for Climate Action: Enhancing Ambition and Scaling Up Implementation. *Journal of Sustainable Finance & Investment* 13(2): 1110–1127. Available at <https://doi.org/10.1080/20430795.2021.1917929>.
- Ahumada, H., S. E. Mairal, F. Navajas, and A. Rasteletti. 2023. Effective Carbon Rates on Energy Use in Latin America and the Caribbean: Estimates and Directions for Reform. Washington, DC: Inter-American Development Bank.
- Akinola, A. O., et al. 2020. Climate Change Adaptation and Mitigation Strategies in Lagos, Nigeria: Built Environment Professionals' Perspective. *International Journal of Engineering and Advanced Technology* 9(3): 1273–1282. Available at <https://doi.org/10.35940/ijeat.B2630.029320>.
- Alhola, K., S.-O. Ryding H. Salmenperä, and N. J. Busch. 2018. Exploiting the Potential of Public Procurement: Opportunities for Circular Economy. *Journal of Industrial Ecology* 1(23): 96–109. Available at <https://doi.org/10.1111/jiec.12770>.
- Aligishiev, Z., M. Bellon, and E. Massetti. 2022. Macro-Fiscal Implications of Adaptation to Climate Change. Washington, DC: International Monetary Fund.
- Ayers, J. M., and S. Huq. 2009. The Value of Linking Mitigation and Adaptation: A Case Study of Bangladesh. *Environmental Management* 43(2009): 753–764. Available at <https://doi.org/10.1007/s00267-008-9223-2>.
- Ballesteros, F., and R. Troncoso. 2023. La transición energética en el nuevo plan de negocios de Pemex. Natural Resource Governance Institute. April 2. <https://resourcegovernance.org/es/articles/la-transicion-energetica-en-el-nuevo-plan-de-negocios-de-pemex>.
- Banerjee, O., M. Cicowiez, A. R. Rios, and C. Z. de Lima. 2021. Climate Change Impacts on Agriculture in Latin America and the Caribbean. IDB Working Paper Series No. IDB-WP-01289. Washington, DC: Inter-American Development Bank. Available at <https://publications.iadb.org/en/climate-change-impacts-agriculture-latin-america-and-caribbean-application-integrated-economic>.

- Barbier, E. B. 2020. Greening the Post-Pandemic Recovery in the G20. *Environmental and Resource Economics* 76(2020): 685–703. Available at <https://doi.org/10.1007/s10640-020-00437-w>.
- Bertrand-Galindo, M., and G. Püschel. 2023. Chile: ESG Comparative Guide. Mondaq. June 5. Available at <https://www.mondaq.com/corporatecommercial-law/1232386/esg-comparative-guide>.
- Bhatia, A., and S. Tuli. 2017. Sustainability Reporting under G3 Guidelines: A Study on Constituents of Bovespa Index. *Vision* 21(2): 204–213. Available at <https://doi.org/10.1177/0972262917701031>.
- Black, S., A. A. Liu, I. Parry, and N. Vernon. 2023. IMF Fossil Fuel Subsidies Data: 2023 Update. Washington, DC: International Monetary Fund.
- BYMA (Bolsas y Mercados Argentinos). 2023. ¿Qué son los Bonos SVS? <https://www.byma.com.ar/productos/bonos-svs/>.
- Bonomo, D. 2023. Brazil's Lula Administration Presents New Fiscal Framework. *Global Policy Watch*. April 3. <https://www.globalpolicywatch.com/2023/04/brazils-lula-administration-presents-new-fiscal-framework/>.
- Borrego, A. C., and F. Carreira. 2019. Green Taxation. In S. Idowu and R. Schmidpeter (eds), *Encyclopedia of Sustainable Management*. Cham, Switzerland: Springer Nature. Available at https://doi.org/10.1007/978-3-030-02006-4_723-1.
- Butler, L., and K. Neuhoﬀ. 2008. Comparison of Feed-in Tariff, Quota and Auction Mechanisms to Support Wind Power Development. *Renewable Energy* 8(33): 1854–1867. Available at <https://doi.org/10.1016/j.renene.2007.10.008>.
- Calero, D., et al. 2020. Hacia un desarrollo resiliente y bajo en emisiones en Latinoamérica y el Caribe: Progreso en la implementación de las Contribuciones Nacionalmente Determinadas (NDC). LEDS LAC.
- Cárdenas, M., and S. Orozco. 2022. Climate Mitigation in Latin America and the Caribbean: A Primer on Transition Costs, Risk, and Financing. New York: Center on Global Energy Policy.
- Castro, V. B., and D. G. Mihret. 2019. Accounting Professionalisation in Brazil: Resistance and Co-Optation in the Introduction of a Professional Entry Exam (1999–2010). *Accounting History* 25(3): 468–487. Available at <https://doi.org/10.1177/1032373219876669>.
- CCRIF SPC. n.d. Company Overview. <https://www.ccrif.org/about-us>.

- CFA Society Brazil. 2021. Green Bonds: Market Development and Future Perspectives for Brazil. São Paulo: CFA Society Brazil.
- CFE. 2022. CFE Impulsa la Transición y la Seguridad Energética; Analiza Recursos Tecnológicos Bajos en Carbono. Press Release. July 15.
<https://app.cfe.mx/Aplicaciones/OTROS/Boletines/boletin?i=2577>.
- Clark, A., and P. Benoit. 2022. Greenhouse Gas Emissions from State-Owned Enterprises: A Preliminary Inventory. February 3. New York: Center on Global Energy Policy. Available at
<https://www.energypolicy.columbia.edu/publications/greenhouse-gas-emissions-state-owned-enterprises-preliminary-inventory/>.
- Climate Action Tracker. 2023. Countries. <https://climateactiontracker.org/countries/>.
- Climate Bonds Initiative. 2021a. Estado del Mercado en América Latina y el Caribe. London: Climate Bonds Initiative.
- . 2021b. Hoja de Ruta para una Taxonomía en Chile: Un paso más hacia la consolidación de la agenda de Finanzas Verdes en el país. Press Release. May.
<https://www.climatebonds.net/resources/press-releases/2021/05/hoja-de-ruta-para-una-taxonom%C3%ADa-en-chile-un-paso-m%C3%A1s-hacia-la>.
- Climate Bonds Initiative, Citi Group, IFC, and J. P. Morgan. 2023. Sustainable Debt Global State of the Market 2022. London: Climate Bonds Initiative.
- Climate Funds Update. 2022. Data Dashboards: Regions.
<https://climatefundsupdate.org/data-dashboard/regions/>.
- Climate Policy Initiative. 2021. Global Landscape of Climate Finance 2021. Washington, DC: Climate Policy Initiative. Available at
<https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>.
- Coalition of Finance Ministers for Climate Action. 2022. Driving Climate Action through Economic and Fiscal Policy and Practice. Washington, DC: Coalition of Finance Ministers for Climate Action.
- . 2023. Strengthening the Role of Ministries of Finance in Driving Climate Action. Washington, DC: Coalition of Finance Ministers for Climate Action.
- Colelli, F. P., I. S. Wing, and E. D. Cian. 2023. Air-Conditioning Adoption and Electricity Demand Highlight Climate Change Mitigation-Adaptation Tradeoffs. Scientific Reports 13 (4413). Available at <https://doi.org/10.1038/s41598-023-31469-z>.

- Conte-Grand, M., A. Rasteletti, and J. D. Muñoz. 2022. Impuestos a los combustibles en la teoría y en la práctica. Washington, DC: Inter-American Development Bank.
- Cullell, M. M. 2022. Estado de la Hacienda Pública. Ministerio de Hacienda (Chile).
- Dafermos, Y. 2022. Climate Change, Central Banking and Financial Supervision: Beyond the Risk Exposure Approach. In S. A. Kappes, L.-P. Rochon, and G. Vallet (eds), Monetary Policy in the United States and Its Impact on the Functional Distribution of Income: 1970–2015. Cheltenham, UK: Edward Elgar.
- Dale, L. 2022. Climate Change Adaptation. New York: Columbia University Press.
- Delgado, R., H. Eguino, and A. Lopes. 2021. Política fiscal y cambio climático: experiencias recientes de los ministerios de finanzas de América Latina y el Caribe. Washington, DC: Inter-American Development Bank.
- De Nijs, P. J., N. J. Berry, G. J. Wells, and D. S. Reay. 2014. Quantification of Biophysical Adaptation Benefits from Climate-Smart Agriculture Using a Bayesian Belief Network. Scientific Reports 4(6682). Available at <https://doi.org/10.1038/srep06682>.
- De Oliveira, C. A. 2023. Brazil spent BRL 118.2 billion on fossil fuel subsidies in 2021. Climate Scorecard. May 9. <https://www.climatescorecard.org/2023/05/brazil-spent-brl-118-2-billion-on-fossil-fuel-subsidies-in-2021/>.
- De Oliveira, W. F., G. Coser, C. M. de Moura, and P. Souza. 2024. Brazilian Sustainable Taxonomy: Inputs for Classifying Land Use Activities. Climate Policy Initiative. Available at <https://www.climatepolicyinitiative.org/publication/brazilian-sustainable-taxonomy-inputs-for-classifying-land-use-activities/>.
- Departamento Nacional de Planeación (Colombia). 2022. Estrategia Nacional de Financiamiento Climático. DNP.
- Díaz, D. A. 2019. Beneficios fiscales y empresariales de las energías renovables. Academia Mexicana de Derecho Fiscal A.C. Available at <https://amdf.org.mx/wp-content/uploads/2018/03/Beneficios-fiscales-y-empresariales-de-las-Energ%C3%ADas-Renovables.pdf>.
- Di Falco, S., F. Adinolfi, M. Bozzola, and F. Capitanio. 2014. Crop Insurance as a Strategy for Adapting to Climate Change. Journal of Agricultural Economics 65(2): 485–504. Available at <https://doi.org/10.1111/1477-9552.12053>.
- Eckstein, D., V. Künzel, and L. Schäfer. 2021. Global Climate Risk Index. Bonn, Germany: Germanwatch. Available at <https://www.germanwatch.org/en/19777>.

- ECLAC (Economic Commission for Latin America and the Caribbean). 2022. Social Panorama of Latin America and the Caribbean. Santiago de Chile: Economic Commission for Latin America and the Caribbean.
- Ecopetrol (Colombia). 2021a. Ecopetrol informa que firmó el Contrato Interadministrativo con el Ministerio de Hacienda y Crédito Público mediante el cual adquiere el 51.4% de la participación accionaria de ISA. Press Release. August 11.
<https://www.ecopetrol.com.co/wps/portal/Home/es/NuestraEmpresa/salaPrensa/ecopetrol-isa>.
- . 2021b. Grupo Ecopetrol anuncia compromiso y plan para lograr cero emisiones netas de carbono en 2050. Press Release. March 25.
https://www.ecopetrol.com.co/wps/portal/Home/es/?1dmy&page=detalleNoticias&urile=wcm:path:/ecopetrol_wcm_library/as_es/noticias/noticias%2B2021/reduccion-emisiones.
- Ehlers, T., D. (N.) Gao, and F. Packer. 2021. A Taxonomy of Sustainable Finance Taxonomies. Basel, Switzerland: Bank for International Settlements.
- Eichberger, S., K. Kaiser, D. Kapanadze, and K. Mdivani. 2023. Budgeting for Climate Action: Lessons from Austria, France, and the European Union. World Bank Blogs: Eurasian Perspectives. June 28. Available at
<https://blogs.worldbank.org/europeandcentralasia/budgeting-climate-action-lessons-austria-france-and-european-union>.
- ENAP (Empresa Nacional del Petróleo, Chile). 2024. Enap adjudica construcción de su primera planta de hidrógeno verde. Press Release. April 4.
<https://www.enap.cl/sala-de-prensa/enap-adjudica-construccion-de-su-primera-planta-de-hidrogeno-verde>.
- Espa, I., and S. E. Rolland. 2015. Subsidies, Clean Energy, and Climate Change. Geneva: World Economic Forum.
- European Central Bank. 2023. The Climate Change Challenge and Fiscal Instruments and Policies in the EU. Frankfurt am Main, Germany: European Central Bank.
- Fucushima, L. 2022. Brazil's Eletrobras May Become Force for Energy Transition After Privatization. Reuters. June 9. <https://www.reuters.com/article/eletrobras-privatization-idUKL1N2XV2CQ>.

- Galindo, L. M., B. Hoffman, and A. Vogt-Schilb. 2022. How Much Will It Cost to Achieve the Climate Goals in Latin America and the Caribbean? Washington, DC: Inter-American Development Bank.
- Goessling, H. 2023. Weather-Dependent Climate Change. EGU23-15532. EGU General Assembly 2023, Vienna, Austria, April 24–28. Available at <https://doi.org/10.5194/egusphere-egu23-15532>.
- González, G. Y., et al. 2022. Primer Informe Anual de Finanzas Sostenibles. Comité de Finanzas Sostenibles México.
- Gowen, A., N. Kommenda, and S. Bashir. 2023. Climate-Linked Ills Threaten Humanity. The Washington Post. September 5. Available at <https://www.washingtonpost.com/climate-environment/interactive/2023/pakistan-extreme-heat-health-impacts-death/>.
- Grafakos, S., et al. 2019. Analytical Framework to Evaluate the Level of Integration of Climate Adaptation and Mitigation in Cities. *Climate Change* 154(2019): 87–106. Available at <https://doi.org/10.1007/s10584-019-02394-w>.
- Green Economy Coalition. n.d. Green Economy Tracker: Green Fiscal and Monetary Policy. Available at <https://greeneconomytracker.org/policies/green-fiscal-monetary-policy>.
- Green Finance for Latin America and the Caribbean. 2023. Argentina Formalizes Its National Sustainable Finance Strategy. News. May 23. <https://greenfinancelac.org/resources/news/argentina-formalizes-its-national-sustainable-finance-strategy/>.
- Guo, B., et al. 2022. The Effects of Environmental Tax Reform on Urban Air Pollution: A Quasi-Natural Experiment Based on the Environmental Protection Tax Law. *Frontiers in Public Health* 10:967524. Available at <https://doi.org/10.3389/fpubh.2022.967524>.
- Hablemos de Bolsa. 2022. ¿Qué emisoras integran el S&P/BMV Total Mexico ESG Index? Blog. July 7. <https://blog.bmv.com.mx/2022/07/que-emisoras-integran-el-sp-bmv-total-mexico-esg-index/>.
- Hallegatte, S., and J. Rozenberg. 2017. Climate Change through a Poverty Lens. *Nature Climate Change* 7(4): 250–256. Available at <https://doi.org/10.1038/nclimate3253>.

- Hamin, M. E., and N. Gurran. 2009. Urban Form and Climate Change: Balancing Adaptation and Mitigation in the U.S. and Australia. *Habitat International* 33(3): 238–245. Available at <https://doi.org/10.1016/j.habitatint.2008.10.005>.
- Henrique, L. 2022. Renewable Energy Sources and Tax Benefits in Brazil. Gescon Blog. <https://gesconconsultoria.com.br/en/2022/09/renewable-energy-sources-and-tax-benefits-in-brazil/>.
- Ibrahim, A.-J., N. S. Shirazi, and A. Mohseni-Cheraghloou. 2021. The Impact of Islamic Financial Development on Energy Intensity: Evidence From Islamic Banks. *Journal of Islamic Monetary Economics and Finance* 7(4): 709–732. Available at <https://doi.org/10.21098/jimf.v7i4.1409>.
- IDB (Inter-American Development Bank). 2023a. Dealing With Debt: Less Risk for More Growth in Latin America and the Caribbean. Washington, DC: Inter-American Development Bank.
- . 2023b. Divulgación (disclosure) de sostenibilidad y riesgos relacionados con el cambio climático en américa latina y el caribe: hacia la transparencia en los mercados financieros verdes. Washington, DC: Inter-American Development Bank. Available at <https://publications.iadb.org/es/divulgacion-disclosure-de-sostenibilidad-y-riesgos-relacionados-con-el-cambio-climatico-en-america>
- . 2023c. IDB Investments. <https://www.iadb.org/en/project-search>.
- IMF (International Monetary Fund). n.d. Fossil Fuel Subsidies. <https://www.imf.org/en/Topics/climate-change/energy-subsidies>.
- . 2012. Fiscal Policy to Mitigate Climate Change. Washington, DC: International Monetary Fund.
- . 2017. World Economic Outlook. October. Seeking Sustainable Growth: Short-Term Recovery, Long-Term Challenges. Chapter 3. Washington, DC: International Monetary Fund.
- . 2020. World Economic Outlook. Washington, DC: International Monetary Fund.
- . 2022a. Chile Technical Assistance Report: An Evaluation of Improved Green Tax Options. Washington, DC: International Monetary Fund.
- . 2022b. Global Financial Stability Report: Navigating the High-Inflation Environment. Washington, DC: International Monetary Fund.
- . 2023. Fiscal Monitor. Climate Crossroads: Fiscal Policies in a Warming World. October. Washington, DC: International Monetary Fund. Available at

<https://www.imf.org/en/Publications/FM/Issues/2023/10/10/fiscal-monitor-october-2023>.

IPCC (Intergovernmental Panel on Climate Change). 2019. Global Warming of 1.5°C. Geneva: Intergovernmental Panel on Climate Change.

———. 2022a. Climate Change 2021: Summary for All. Geneva: Intergovernmental Panel on Climate Change.

———. 2022b. Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Sixth Assessment Report (IPCC WGII AR6). Geneva: Intergovernmental Panel on Climate Change. Available at <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>.

———. 2022c. IPCC Sixth Assessment Report: Summary for Policy Makers. Geneva: Intergovernmental Panel on Climate Change.

IRENA. 2022. Renewables 2022 Global Status Report: Latin America Factsheet. Abu Dhabi: International Renewable Energy Agency.

———. 2023. Global Landscape of Renewable Energy Finance 2023. Abu Dhabi: International Renewable Energy Agency.

Jain, G. 2022. Thematic Bonds: Financing Net-Zero Transition in Emerging Market and Developing Economies. New York: Center on Global Energy Policy.

Jewell, J., et al. 2018. Limited Emission Reductions from Fuel Subsidy Removal Except in Energy-Exporting Regions. *Nature* 7691(554): 229–233. Available at <https://doi.org/10.1038/nature25467>.

Jiménez, E., and G. Visconti. 2023. A Transformative Approach: IDB and GCF Partnership for Climate Action in Latin America and the Caribbean. *Hablemos de Sostenibilidad y Cambio Climático* (IDB blog). February 2. <https://blogs.iadb.org/sostenibilidad/en/a-transformative-approach-idb-and-gcf-partnership-for-climate-action-in-latin-america-and-the-caribbean-2/#:~:text=Our%20estimates%20indicate%20that%20damage,urgent%20for%20and%20from%20everyone>.

Klenert, D., G. Schwerhoff, O. Edenhofer, and L. Mattauch. 2018. Environmental Taxation, Inequality and Engel's Law: The Double Dividend of Redistribution. *Environmental and Resource Economics* 71:605–624. Available at <https://doi.org/10.1007/s10640-016-0070-y>.

- Kreibiehl, S., et al. 2022. Investment and Finance. In IPCC, Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: Intergovernmental Panel on Climate Change. Available at https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_15.pdf.
- Krishnan, M., et al. 2022. The Net-Zero Transition: What It Would Cost, What It Would Bring. McKinsey & Company. <https://www.mckinsey.com/~media/mckinsey/business%20functions/sustainability/our%20insights/the%20net%20zero%20transition%20what%20it%20would%20cost%20what%20it%20could%20bring/the-net-zero-transition-executive-summary.pdf>.
- Lachaud, M. A., B. E. Bravo-Ureta, and C. E. Ludena. 2022. Economic Effects of Climate Change on Agricultural Production and Productivity in Latin America and the Caribbean (LAC). *Agricultural Economics* 53:321–332. Available at <https://doi.org/10.1111/agec.12682>.
- Laukkonen, J., et al. 2009. Combining Climate Change Adaptation and Mitigation Measures at the Local Level. *Habitat International* 33(3): 287–292. Available at <https://doi.org/10.1016/j.habitatint.2008.10.003>.
- MINAM (Ministerio del Ambiente, Peru). 2022. Finanzas Verdes: Identificación de Brechas Regulatorias e Institucionales para su Promoción en el Perú. Lima: Ministerio del Ambiente.
- . 2023. La Emisión de Bonos Verdes y Sostenibles en el Perú. Lima: Ministerio del Ambiente.
- Ministerio de Economía Argentina. 2022. Informe final de actividades de la Mesa Técnica de Finanzas Sostenibles de Argentina (MTFS). Ministerio de Economía Argentina.
- Ministerio de Hacienda (Chile). 2019. Chile obtiene tasa históricamente baja en exitosa emisión de su primer bono verde. News. June 17. <https://www.hacienda.cl/areas-de-trabajo/finanzas-internacionales/oficina-de-la-deuda-publica/noticias/chile-obtiene-tasa-historicamente-baja-en-exitosa-emision-de-su-primer-bono-306763>.

- . 2023a. Hacienda lanzó la Estructura de la Taxonomía de Actividades Económicas Medioambientalmente Sostenibles para Chile. News. August 17.
<https://www.hacienda.cl/subsecretaria/noticias/hacienda-lanzo-la-estructura-de-la-taxonomia-de-actividades-economicas>.
- . 2023b. Ministerio de Hacienda realiza colocación de bonos vinculados a la sostenibilidad por US\$2.250 millones y se convierte en el primer país del mundo en incluir compromisos asociados a igualdad de género. News. June 27.
<https://www.hacienda.cl/noticias-y-eventos/noticias/ministerio-de-hacienda-realiza-colocacion-de-bonos-vinculados-a-la>.
- Ministerio de Hacienda y Crédito Público (Colombia). 2022. Taxonomía verde de Colombia. Gobierno de Colombia.
- . 2023. Marco Fiscal de Mediano Plazo. Ministerio de Hacienda y Crédito Público.
- Munich Re. n.d. Natural Disaster Risks: Rising Trend in Losses. Available at
<https://www.munichre.com/en/risks/natural-disasters.html#1995343501>.
- Muniz, R. J., and J. A. Jimber Del Rio. 2023. Impact of the Climate Change on the Production of the Fishing and Aquaculture Sectors of Latin America. *International Journal of Energy Economics and Policy* 13(3): 80–91. Available at
<https://doi.org/10.32479/ijeep.14205>.
- Necoechea Porras, P. D. 2023. Mexico spent \$16.6 billion in direct and indirect fossil fuel subsidies in 2018. *Climate Scorecard*. May 9.
<https://www.climatescorecard.org/2023/05/mexico-spent-16-6-billion-in-direct-and-indirect-fossil-fuel-subsidies-in-2018/#:~:text=Per%20the%20IISD%2C%20the%20government,to%20phase%20them%20out%20completely>.
- Newbery, D. M. 2016. Towards a Green Energy Economy? The EU Energy Union's Transition to a Low-Carbon Zero Subsidy Electricity System: Lessons from the UK's Electricity Market Reform. *Applied Energy* 179:1321–1330. Available at
<https://doi.org/10.1016/j.apenergy.2016.01.046>.
- Nissen, A. E. 2021. A greener shade of black? Statoil, the Norwegian government and climate change, 1990–2005. *Scandinavian Journal of History* 46(3): 408–429. Available at <https://doi.org/10.1080/03468755.2021.1876757>.
- OECD (Organisation for Economic Co-operation and Development). 2020. *OECD Green Budgeting Framework*. Paris: OECD Publishing.

- . 2022. Climate Change and Low-Carbon Transition Policies in State-Owned Enterprises. OECD Business and Finance Policy Papers No. 5. Paris: OECD Publishing. Available at <https://doi.org/10.1787/e3f7346c-en>.
- . 2023. Principles of Budgetary Governance. Paris: OECD Publishing. Available at <https://www.oecd.org/gov/budgeting/principles-budgetary-governance.htm>.
- Ortiz-Bobea, A., et al. 2021. Anthropogenic climate change has slowed global agricultural productivity growth. *Nature Climate Change* 4(11): 306–312. Available at <https://doi.org/10.1038/s41558-021-01000-1>.
- Osinergrmin (Organismo Supervisor de la Inversión en Energía y Minería [Peru]). 2019. Energías Renovables: Experiencia y Perspectivas en la Ruta del Perú hacia La Transición Energética. Lima: Osinergrmin.
- Palacios, L., and J. J. Guzmán. 2023. Financing the Energy Transition in Latin America and the Caribbean: An Incomplete Puzzle. Center on Global Energy Policy.
- Petrobras. 2023. Climate change and transitioning to low carbon. <https://petrobras.com.br/en/sustentabilidade/mudancas-climaticas#:~:text=Our%20commitment%20is%20to%20seek,kgCO2%20e%2Fb,oe%20in%202023>.
- Petroperú. 2024. Petroperú da el primer paso en el uso de energías renovables. Press Release. February 6. <https://www.petroperu.com.pe/petroperu-da-el-primer-paso-en-el-uso-de-energias-renovables>.
- Pickering, J., et al. 2015. Acting on Climate Finance Pledges: Inter-Agency Dynamics and Relationships with Aid in Contributor States. *World Development* 68:149–162. Available at <https://doi.org/10.1016/j.worlddev.2014.10.033>.
- Pizarro, R., R. Delgado, H. Eguino, and A. L. Pereira. 2021. Climate Change Public Budget Tagging. Washington, DC: Inter-American Development Bank.
- Quinson, T. 2023. Green Bonds Take Big Lead over Fossil-Fuel Debt Deals. Bloomberg: Green ESG & Investing. July 5. https://www.bloomberg.com/news/articles/2023-07-05/green-bonds-take-big-lead-over-fossil-fuel-debt-deals?in_source=embedded-checkout-banner.
- Rentschler, J., and M. Bazilian. 2016. Reforming Fossil Fuel Subsidies: Drivers, Barriers and the State of Progress. *Climate Policy* 17(7): 891–914. Available at <https://doi.org/10.1080/14693062.2016.1169393>.

- Roshen, F., W. Liu, and W. J. McKibbin. 2021. Global Economic Impacts of Climate Shocks, Climate Policy And Changes in Climate Risk Assessment. CAMA Working Paper No. 37/2021. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3817111.
- Ruta, G., et al. 2021. The Economic Case for Nature. Washington, DC: World Bank Group. Available at <https://www.worldbank.org/en/topic/environment/publication/the-economic-case-for-nature>.
- Schwartz, M. J., and D. W. Beuermann. 2021. Economic Institutions for a Resilient Caribbean. Washington, DC: Inter-American Development Bank.
- Secretaría de Hacienda y Crédito Público (Mexico). 2022. Comunicado No. 36 Emisión inaugural del mercado local sustentable. Press Release. May 2. Mexico City: Secretaría de Hacienda y Crédito Público. <https://www.gob.mx/shcp/prensa/comunicado-no-36-emision-inaugural-del-mercado-local-sustentable>.
- . 2023a. Marco de Referencia de los Bonos Soberanos Vinculados a los Objetivos de Desarrollo Sostenible (ODS). Mexico City: Gobierno de México.
- . 2023b. Mexico City: Taxonomía Sostenible de México.
- SFC (Superintendencia Financiera de Colombia). 2022. Superfinanciera presentó su hoja de ruta para incorporar en el sistema financiero colombiano los riesgos y oportunidades relacionados con asuntos ambientales. <https://www.superfinanciera.gov.co/publicaciones/10111958/industrias-supervisadasfinanzas-sosteniblessuperfinanciera-presento-su-hoja-de-ruta-para-incorporar-en-el-sistema-financiero-colombiano-los-riesgos-y-oportunidades-relacionados-con-asuntos-ambientales-10111958/>.
- Shuttleworth, A., and K. MacAskill. 2021. Net zero adaptation: A review of built environment sustainability assessment tools. Environmental Research Infrastructure and Sustainability 1:023002. Available at <https://doi.org/10.1088/2634-4505/ac1c5e>.
- Song, D., B. Jia, and H. Jiao. 2022. Review of Renewable Energy Subsidy System in China. Energies 15(19): 7429. Available at <https://doi.org/10.3390/en15197429>.
- Takeda, S., and T. H. Arimura. 2021. A computable general equilibrium analysis of environmental tax reform in Japan with a forward-looking dynamic model.

- Sustainability Science 16:503–521. Available at <https://doi.org/10.1007/s11625-021-00903-4>.
- Taylor, M. 2021. World Bank: Economy faces huge losses if we fail to protect nature. World Economic Forum (blog). July 6. <https://www.weforum.org/agenda/2021/07/climate-change-economic-cost-world-bank-environment/>.
- Thür, D. 2022. Green Taxonomies around the World: Where Do We Stand? Eco:Fact (blog). November 1. <https://www.ecofact.com/blog/green-taxonomies-around-the-world-where-do-we-stand/>.
- Tol, R. S. J. 2022. A Meta-Analysis of the Total Economic Impact of Climate Change. Tinbergen Institute Discussion Paper TI 2022-056/VIII. Available at <https://papers.tinbergen.nl/22056.pdf>.
- UNCTAD (United Nations Trade and Development). 2023. World Investment Report 2023. Geneva: United Nations Trade and Development.
- UNDP (United Nations Development Programme). 2021. Thematic Bonds 101: Macro Environment, Market Dynamics and Steps to Issuance. New York: United Nations Development Programme.
- UNEP (United Nations Environment Programme). 2022a. Adaptation Gap Report 2022. Nairobi: UNEP. Available at <https://www.unep.org/resources/adaptation-gap-report-2022>.
- . 2022b. Emissions Gap Report. Nairobi: United Nations Environment Programme.
- UNEP and GIZ. 2017. Peru Country Profile. Green Fiscal Policy Network. March 30. Available at https://greenfiscalspolicy.org/policy_briefs/peru-country-profile/.
- UN ESCAP (United Nations Economic and Social Commission for Asia and the Pacific). 2021. An Introduction to Issuing Thematic Bonds. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.
- UN-Habitat (United Nations Human Settlements Programme). 2020. World Cities Report 2020: The Value of Sustainable Urbanization. Nairobi: United Nations Human Settlements Programme.
- United Kingdom Government. 2012. Definition of environmental tax published. Gov.uk Press Release. July 16. <https://www.gov.uk/government/news/definition-of-environmental-tax-published>.

- Villanueva, D., and A. Ghosh. 2024. Mexico ETS delay likely to persist on regulatory uncertainty, lack of political will: sources. April 3. S&P Global.
<https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/040324-mexico-ets-delay-likely-to-persist-on-regulatory-uncertainty-lack-of-political-will-sources>
- Withana, S., et al. 2013. Evaluation of Environmental Tax Reforms: International Experiences. Brussels: Institute for European Environmental Policy.
- WMO (World Meteorological Organization). 2023. State of the Climate in Latin America and the Caribbean 2022. Geneva: World Meteorological Organization.
- World Bank. 2019. Improving Climate Resilience of Federal Road Network in Brazil. Washington, DC: World Bank. Available at
<https://elibrary.worldbank.org/doi/abs/10.1596/32189>.
- . 2021. A Roadmap for Climate Action in Latin America and the Caribbean 2021–2025. Washington, DC: World Bank.
- . 2022a. Colombia: Leading the Path to Sustainability in Latin America. World Bank News. September 7.
<https://www.worldbank.org/en/news/feature/2022/08/31/colombia-leading-the-path-to-sustainability-in-latin-america>.
- . 2022b. Water Matters: Resilient, Inclusive and Green Growth through Water Security in Latin America. Washington, DC: World Bank. Available at
<https://openknowledge.worldbank.org/entities/publication/cf66ba5a-a223-550e-8d7a-40cd4124cbec>.
- . 2023a. Agriculture, forestry, and fishing, value added (% of GDP) - Latin America & Caribbean. The World Bank DataBank.
<https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=ZJ>.
- . 2023b. Carbon Pricing Dashboard. Washington, DC: World Bank.
<https://carbonpricingdashboard.worldbank.org>.
- Yépez, A. 2022. Five Things You Should Know about the Green Energy Transition in Latin America and the Caribbean. Energía para el futuro (IDB blog). November 14. [https://blogs.iadb.org/energia/en/five-things-you-should-know-about-the-green-energy-transition-in-latin-america-and-the-caribbean/#:~:text=In%20Latin%20America%20and%20the%20Caribbean%20\(LAC\)%2C%20countries%20have,meet%20their%20growing%20electricity%20d](https://blogs.iadb.org/energia/en/five-things-you-should-know-about-the-green-energy-transition-in-latin-america-and-the-caribbean/#:~:text=In%20Latin%20America%20and%20the%20Caribbean%20(LAC)%2C%20countries%20have,meet%20their%20growing%20electricity%20d)

YPF. 2022. Sustainability. https://sustentabilidad.ypf.com/index_en.html.

Yu, F., et al. 2016. The impact of government subsidies and enterprises' R&D investment: A panel data study from renewable energy in China. *Energy Policy* 89:106–113. Available at <https://doi.org/10.1016/j.enpol.2015.11.009>.

Yu, H.-Y., and B.-Y. Tsai. 2018. Environmental Policy and Sustainable Development: An Empirical Study on Carbon Reduction among Chinese Enterprises. *Corporate Social Responsibility and Environmental Management* 25(5): 1019–1026. Available at <https://doi.org/10.1002/csr.1499>.

Appendix A. Mitigation and Adaptation: Complementarities and Tensions

Despite mitigation efforts to curb further temperature increases, global warming has already resulted in severe impacts on human societies and the environment, making adaptation projects indispensable to cope with the consequences of climate change. This emerging situation presents governments with an unusual dilemma where finding a pragmatic balance between mitigation and adaptation seems more complex than it appears. Mitigation and adaptation can coexist, though ensuring complementarity is not always straightforward. It is crucial for governments to identify synergies and conflicts between mitigation and adaptation efforts to ensure a coherent and just transition to a low-carbon economy in addressing climate change. This section discusses the synergies and tensions between climate change mitigation and adaptation with a focus on the role of fiscal policy.

The urgency to limit global warming and prevent irreversible consequences for human and natural habitats has led governments to prioritize mitigation efforts over adaptation. According to the Climate Policy Initiative (2021), mitigation projects represented 92.5 percent of all climate projects in 2019–2020, with adaptation taking a residual 7.5 percent. The urgency to limit global warming has encouraged governments to prioritize mitigation efforts. However, it is also possible that investment in adaptation is inadequately measured because it is often embedded in infrastructure projects with broader purposes, as in the case of a climate-resilient highway. At the same time, countries have recently started experiencing the impacts of climate change, recognizing the importance of climate change adaptation. As the impacts of climate change unfold, governments are now realizing that adapting to actual or expected climate changes and their effects is essential.

Despite concentrating their efforts on mitigation, countries worldwide fail to meet their national climate pledges, posing more environmental risks. The United Nations Environment Programme's Emissions Gap Report (UNEP, 2022b) reveals that global efforts are falling significantly short of achieving the ambitious target of limiting global warming to 1.5°C, as outlined in the Paris Agreement. In the case of LAC countries, the Climate Action Tracker (2023) evaluates mitigating efforts from all LAC countries as insufficient. Current efforts from the region will lead to a global temperature increase of more than 3°C. In contrast, if implemented, current national climate pledges would lead

to a global temperature rise of approximately 2.8°C by the end of the 21st century. Environmental impacts will intensify alarmingly, including adverse effects on ecosystems, biodiversity, and vulnerable communities. Furthermore, low adaptive capacity poses a critical risk to achieving the UN's Sustainable Development Goals (SDGs).

Perhaps the most relevant challenge is related to impact measurement: there is no singular unit for adaptation outcomes (in contrast to mitigation projects that have a standard measurement unit—i.e., carbon emissions). According to de Nijs et al. (2014, 1), “the difficulty of assessing and monitoring when adaptation is achieved is one of the key barriers to the disbursement of performance-based adaptation finance.” Adaptation also requires short-term investments while facing significant long-term uncertainty. Another difficulty is the lack of information on climate change risks to galvanize strategic investments and the capacity to structure adaptation projects (Adhikari and Chalkasra, 2021).

Moreover, mobilizing private sector investments to scale up ambitious climate change adaptation projects is problematic for various reasons. First, climate change adaptation projects frequently lack immediate short-term returns. Second, adaptation projects typically involve significant investments with long-term benefits that may not be realized for several years. Consequently, the appeal of these investments to the private sector is lower than it is for mitigation or other investments with quantifiable financial returns. Third, quantifying a project's benefits and financial returns can be challenging: benefits can be measured in the long term as avoiding losses or non-materialized risks, reducing the negative impacts such as damage to infrastructure loss of crops, or minimizing physical, regulatory, market, or operational risks. Fourth, gathering sufficient data on private sector adaptation investments and accurately assessing the private sector's response to climate risks remain challenging due to limited available information and, as mentioned above, the fact that adaptation in many cases is a co-benefit of other investment goals.

The private sector's investment in climate adaptation requires a comprehensive policy framework. Based on a series of case studies of small- and medium-sized businesses and multinational companies, Adhikari and Chalkasra (2021) conclude that the lack of financially viable and bankable projects and incomplete understanding of climate risks limit private investment in adaptation. Additionally, the absence of a

cohesive national policy framework discourages private sector investment in adaptation initiatives. In sum, challenges for private climate adaptation investments include:

- Adaptation projects do not possess a unit for measuring and comparing climate benefits.
- It is difficult to assess and monitor when adaptation is achieved.
- There is limited data availability and limitations on tracking the private sector's adaptation finance.
- The private sector prioritizes investments with short-term and measurable returns.
- Lack of access to public finance and insurance diminishes the private sector's appetite.
- Adaptation projects are associated with high risks.
- There is a lack of financially viable and bankable projects.
- Understanding of climate risks to inform adaptation decisions is incomplete.
- Countries lack a national framework and policy environment for climate change adaptation.

Countries are beginning to understand that the most appropriate alternative is combining mitigation and adaptation. Governments need to increase their efforts on both fronts because, without adequate mitigation efforts, climate change is expected to surpass the ability of natural and human systems to adapt over time. Relying solely on adaptation measures could eventually result in a level of climate change that exceeds the limits of effective adaptation, or that could only be achieved in specific cases at significant social, environmental, and economic expense (IPCC, 2022c). In other words, "mitigation aims to avoid the unmanageable, and adaptation aims to manage the unavoidable" (Laukkonen et al., 2009, 288).

Interactions between adaptation and mitigation can be complementary. Some climate policy actions, initiatives, and projects can simultaneously contribute to reducing greenhouse gas (GHG) emissions and increasing adaptation efforts to climate change's adverse effects. For instance, waste-to-compost projects in Bangladesh have been shown to contribute to mitigation and adaptation goals, as they reduce methane emissions while improving soil quality in drought-prone areas (Ayers and Huq, 2009). Furthermore, greening areas, planting trees, enforcing sustainable building guidelines,

and implementing energy efficiency measures have effectively integrated mitigation and adaptation efforts (Akinola et al., 2020). Adaptation and mitigation can be complementary and, when combined, can lead to co-benefits and cost savings. Governments should prioritize the identification and implementation of these types of combined projects because they will be able to, for example, reduce emissions while adapting to existing climate variability.

Nonetheless, there can be instances where climate change mitigation and adaptation efforts exhibit conflicts. From 2010 to 2020, there was an increase in adaptation projects and policies that could be counterproductive to mitigation efforts. The use of air-conditioning is an example of a potential contradiction between climate change mitigation and adaptation. When populations are exposed to heat waves and increased temperatures, threatening human lives, the use of air-conditioning grows, improving the population's living conditions. However, using air-conditioning increases electricity demand, causing additional CO₂ emissions if the additional electricity generated is produced with today's power mix (Colelli, Wing, and Cian, 2023). The growing utilization of biofuels presents an additional instance of conflict between climate change mitigation and adaptation due to potential trade-offs in land use. From the adaptation perspective, land deforestation to allow for increased biofuel crop production can lead to fewer valuable natural habitats that could have helped address the effects of climate change; on the other hand, those biofuels create a more sustainable energy alternative by reducing reliance on fossil fuels. The construction of seawalls or hard coastal defenses presents an additional tension between adaptation and mitigation. While constructing adaptation infrastructure can increase climate change resilience in coastal areas, it will also increase GHG emissions, diminishing mitigation efforts. Recognizing and addressing the potential conflicts between climate change mitigation and adaptation efforts is crucial, ensuring a balanced and integrated approach to address climate policies.

Table A1. Adaptation and Mitigation Policies: Complementarity and Contradictions

Policy or Initiative	Adaptation	Mitigation	Potential Conflict
Biodiversity			
Protected area expansion and management, afforestation, and reforestation	Yes	Yes	No
Ecosystem restoration and conservation	Yes	Yes	No
Sustainable agricultural practices: promoting agroecological approaches, organic farming, and precision agriculture	Yes	Yes	No
Conservation: connect habitat through dedicated habitat protection corridors	Yes	No	No
Create planning system incentives and requirements for new developments to retain and restore local biodiversity	Yes	No	Yes
Natural Hazards			
Specify sea level/natural hazard thresholds or indicators as a basis for setting coastline building rules for setback/elevation/removal of buildings	Yes	No	No
Early warning systems: implementing early-warning systems for natural hazards (e.g., hurricanes, floods, and wildfires) helps communities prepare and respond effectively to minimize the impact on human lives and infrastructure	Yes	No	No
Hazard-resistant infrastructure design: incorporating hazard-resistant design features (e.g., earthquake-resistant structures or flood-proofing techniques) into infrastructure projects helps minimize damage and disruption caused by natural hazards	Yes	Yes	No
Establish policy framework for re-situating land uses that may become unsafe or unsuitable in the future due to climate change	Yes	No	Yes
Housing/Infrastructure			
Retrofitting existing buildings: upgrading and retrofitting existing buildings (e.g., strengthening foundations, installing storm shutters, and reinforcing roofs) can enhance their resilience to natural hazards	Yes	Yes	No
Air-conditioning to improve living conditions	Yes	No	Yes
Construction of seawalls or hard coastal defenses	Yes	No	Yes

Water			
Emphasize the protection of natural hydrological systems to improve their resilience to possible climate change impacts	Yes	No	No
Maintain spaces for floods and water retention in regions where rainfall patterns are likely to become more volatile	Yes	Yes	No
Construction of large-scale dams	Yes	No	Yes
Transportation			
Design and reconfigure settlements to reduce the need for trip generation and to maximize viability of public transport, assess the transportation impacts of major new developments	Yes	Yes	Yes
Ensure that new settlements are accessible by all-weather roads or alternative routes	Yes	No	Yes
Energy			
Draft renewable-friendly energy planning codes so broader environmental benefits can be assessed with local impacts	No	Yes	No
Mini grids with renewable energy	Yes	Yes	No
Create planning requirements for major new developments to preserve and utilize local sources of renewable energy as much as possible	No	Yes	No
Enforce building and urban design requirements that minimize energy requirements and maximize thermal comfort	Yes	Yes	No
Waste			
Reserve local sites to accommodate waste sorting, recycling, and reuse	No	Yes	No
Establish provisions for composting at site or neighborhood level, reducing land fill and water needs	No	Yes	No
Waste-to-energy	Yes	Yes	Yes
Health			
Require shading, shelter, and appropriate vegetation to cool areas of open space and walkways or cycle paths	Yes	Yes	No
Disease surveillance and early warning systems	Yes	No	No
Heat-health action plans	Yes	No	No
Air quality improvement initiatives	No	Yes	No

Source: Authors' analysis and elaboration based on Hamin and Gurran (2009).

At present, existing guidance on policy decisions for climate change mitigation or adaptation often lacks identification of potential conflicts and offers limited solutions to address these dilemmas. National and local governments have managed climate change adaptation and mitigation strategies without addressing their potential synergies, conflicts, or trade-offs (Grafakos et al., 2019). In fact, "in the early years of UN-led global governance for climate change, misguided hope led many to conclude that mitigation efforts would be effective, and adaptation was viewed as both more abstract and more temporally distant" (Dale, 2022, 23).

Another important distinction is that climate change mitigation has been managed nationally, while many adaptation projects are handled locally or regionally. The fact that adaptation is executed at a local level reflects the importance of addressing the impacts in communities where they are most acutely experienced. The segregation of adaptation and mitigation has led to the implementation of divergent approaches to face climate change.

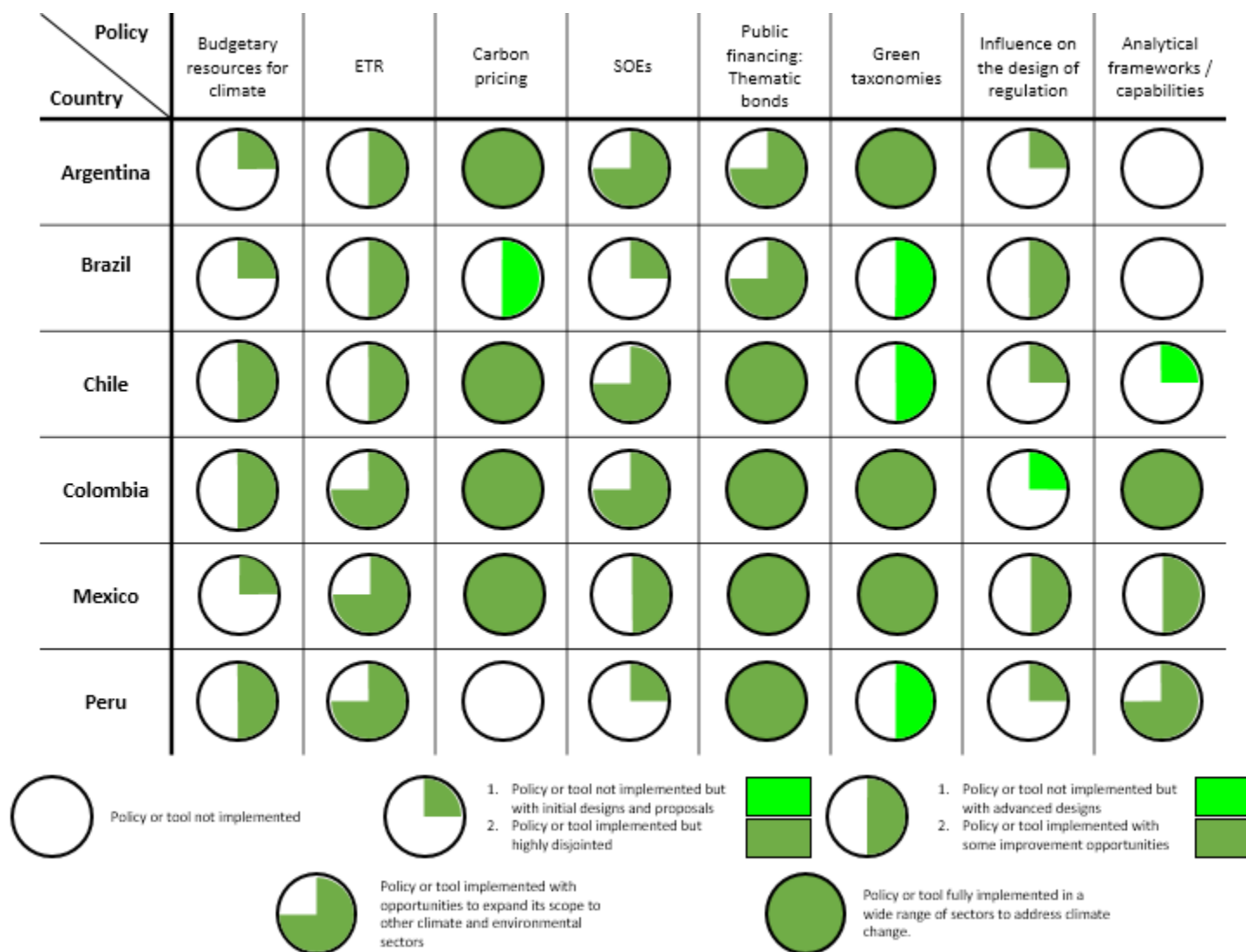
Countries must implement a comprehensive approach that creates synergies between adaptation and mitigation to address climate change. The synergies between adaptation and mitigation can provide co-benefits and cost savings; nonetheless, it will require a coordinated collaboration among different stakeholders including various levels of government, the private sector, and civil society organizations. Shuttleworth and MacAskill (2021) propose a set of tools and methodologies that effectively integrate adaptation and mitigation efforts to address climate change. Without a coherent integration between both approaches, countries will not achieve an effective response to climate change.

Fiscal policies will play a key role in managing mitigation and adaptation initiatives. Assigning national resources to both mitigation and adaptation initiatives in a way that enhances complementarity and reduces tensions is fundamental. Fiscal policy should also play a catalytic role in attracting private investment.

Appendix B. Green Fiscal Policy Maturity Assessment for the Six Largest Economies in Latin America and the Caribbean

Figure A1 looks at the level of implementation of the various fiscal interventions across the six largest economies in the region, without assessing the quality of each country's policies. For each country, eight policies and tools with five levels of implementation are considered (without analyzing the role of multilateral development banks [MDBs]): (i) Policy or tool not implemented, (ii) Policy or tool not implemented but with initial designs and proposals or implemented but highly disjointed, (iii) Policy or tool not implemented but with advanced designs or implemented with some improvement opportunities, (iv) Policy or tool implemented with opportunities to expand its scope to other climate and environmental sectors, and (v) Policy or tool fully implemented in a wide range of sectors to address climate change. For each country, a small summary of the main findings is provided. **Error! Reference source not found.** shows that the maturity of green fiscal policy implementation differs across countries. This appendix provides a detailed analysis of each country's level of implementation for all eight policies evaluated.

Figure A1. Green Fiscal Policy Maturity Implementation Level for LAC's Six Largest Economies



Source: Authors' elaboration.

1. Brazil

Allocation of Budgetary Resources to Finance Climate Actions

Brazil's shift under Bolsonaro's administration led to the dismantling of green policies and efforts to contain deforestation despite implementing specific initiatives such as the Program of Incentives for Alternative Electricity Sources. Consequently, green fiscal policy remains weak, although the government has implemented some efforts to encourage green investments (Green Economy Coalition, n.d.). Nonetheless, during Lula da Silva's third term, Brazil is analyzing new fiscal measures for climate change and energy projects. Brazil maintains substantial fossil fuel subsidies and deliberately supports oil, natural gas, and coal production and consumption as a matter of national interest (de Oliveira, 2023).

Environmental Tax Reforms

Brazil has not yet imposed an explicit price on carbon, although some states have implemented fuel excise taxes, an implicit form of carbon pricing. Moreover, Brazil offers a range of tax incentives to promote renewable energy adoption. These include property tax discounts (Green IPTU), import tax exemption for solar modules, reduced Tax on Circulation of Goods and Services (ICMS) on energy consumption, ICMS exemption for solar and wind equipment, and tax benefits for solar R&D (Program to Support Technological Development in the Semiconductor and Display Industry, or PADIS). Additionally, the REIDI scheme provides PIS/COFINS exemptions for energy sector infrastructure projects (Henrique, 2022). However, Brazil should implement further taxation measures to enhance funding for various climate requirements beyond the energy industry.

Carbon Pricing

Brazil is taking steps toward implementing an emissions trading system (ETS). In May 2022, Decree 11,075 established the National System for the Reduction of Greenhouse Gas Emissions (SINARE), requiring sector-specific climate plans with defined targets. Legislative discussions have also introduced bills in Congress for an ETS, featuring common elements like a greenhouse gas (GHG) monitoring system and a registry for carbon credits from domestic projects, which the finance ministry (FM) could use for compliance under an ETS (World Bank, 2023b).

State-Owned Enterprises

Several state-owned enterprises (SOEs), such as Petrobras and Eletrobras, are implementing energy transition and climate change strategies. Petrobras has implemented different measures to reduce operational emissions along its value chain but has not implemented broader strategic actions outside its core operations (Petrobras, 2023). Eletrobras is increasing its investments in renewable energies in wind and solar generation to diversify its highly concentrated hydroelectric assets base (Fucushima, 2022).

Public Financing: Use of Thematic Bonds

Brazil has the largest green bond market in LAC, with US\$9 billion in issuance (CFA Society Brazil, 2021). Although the private sector issued most of the bonds up to 2021 (52 out of 60), some public financial and government-backed entities have issued green bonds to fund renewable energy and energy efficiency projects, such as the Development Bank of Minas Gerais (BDMG) (CFA Society Brazil, 2021). The government has not yet issued sovereign thematic bonds.

Green Taxonomies

Brazil initiated the development of its Green Taxonomy in 2023, led by the Ministry of Finance as part of the country's broader Ecological Transformation Plan under the "sustainable finance" framework. The Taxonomy Action Plan was formally introduced during COP28 in Dubai in December 2023. The initial release of the taxonomy is anticipated by November 2024, with mandatory adoption slated for January 2026 (de Oliveira et al., 2024).

Influence on the Design of Regulation

The Brazilian government recognized the importance of improving financial reporting and decided to move towards a global financial reporting system by converging national accounting rules with the International Financial Reporting Standards (IFRS), which includes sustainability information and disclosure of climate change-related risks (Castro and Mihret, 2019). Moreover, Brazil's stock exchange has implemented the Corporate Sustainability Index (ISE), which (voluntarily) assesses the sustainability performance of companies on the exchange (Bhatia and Tuli, 2017). The FM's efforts to influence financial regulations with climate change objectives have been limited, and

the country's progress in implementing comprehensive green fiscal tools like carbon credits and green budgeting is in the early stages. While some tax incentives exist for renewable energy, Brazil's solid subsidies for fossil fuels, particularly for oil and natural gas, have been dominant. These subsidies, aimed at stabilizing energy prices and supporting domestic industries, indicate a complex policy landscape, suggesting ample opportunities to align with environmental goals.

Analytical Frameworks and Capabilities

Although climate change perspectives are uncertain, Brazil is developing a new fiscal policy framework to balance fiscal and social responsibility (Bonomo, 2023). The framework's main features include an annual primary budget surplus target, which will gradually increase from -0.5 percent of GDP in 2023 to 1.0 percent in 2026. Additionally, spending growth will be linked to a revenue increase of 70 percent, with adjustments during economic crises and booms. The framework is expected to replace the current spending cap framework and has garnered market approval due to its transparent rules and flexibility (Bonomo, 2023). However, as with all other regional fiscal rules, there is no consideration of climate goals.

2. Mexico

Allocation of Budgetary Resources to Finance Climate Actions

Mexico has taken steps toward addressing environmental sustainability in its fiscal and monetary policies, including establishing National Council for the Promotion of Investment, Employment, and Economic Growth (COFINECE)²¹ and the Green Finance Advisory Board (CCFV) (Green Economy Coalition, n.d.). However, the government maintains high fossil fuel subsidies and will not phase them out altogether. The government retains direct subsidies to oil and gas companies, subsidies to help low-income households pay for fossil fuel-supported energy efforts, and subsidies for fossil fuel imports and exports (Necoechea Porras, 2023). Mexico must strengthen its climate change policies through an integral green fiscal policy approach.

Environmental Tax Reforms

²¹ COFINECE's goal is to promote domestic and foreign investments through various mechanisms that benefit Mexico's economic growth and job creation.

Mexico has enacted legislation regulating renewable energy and clean technologies, offering fiscal benefits to those using renewable energy equipment. Mexico's renewable energy incentives include a 100 percent tax deduction on renewable energy machinery, 30 percent tax credits for electric vehicle charging and technological research, reduced taxes for high-tech companies (including 55 percent on payroll and 80 percent on property acquisition), and an exemption for electric vehicles from the New Automobile Tax (Díaz, 2019).

Carbon Pricing

The Mexican carbon tax operates as an excise tax within the special tax on production and services framework. The government imposes a tax on the sale and import of all fossil fuels except natural gas. Taxpayers can opt to pay using carbon credits from Mexican UNFCCC-endorsed projects. The generated revenue goes to the general budget without specified purposes. In March 2022, the government announced a carbon tax exemption for gasoline and diesel, valid until December 31, 2024 (World Bank, 2023b). Conversely, the states of Zacatecas and Tamaulipas have enacted localized carbon taxes, and as of this writing Jalisco state is deliberating their adoption.

Additionally, in January 2020, Mexico launched its inaugural ETS, the first in Latin America, targeting CO₂ emissions from significant energy and industry-fixed sources. This initiative covers approximately 40 percent of national GHG emissions and 90 percent of those reported in the National Emissions Registry (RENE), with allowances distributed based on historical emissions (World Bank, 2023b). However, transitioning into its operational phase has been more challenging than anticipated; Mexico is facing vague political commitment, regulatory instability, and increasing concerns regarding the Ministry of Environment and Natural Resources' ability to implement the ETS (Villanueva and Ghosh, 2024).

State-Owned Enterprises

In 2023, PEMEX, the state-owned petroleum company, announced the integration of the energy transition component in its latest business plan. It is considering risks related to decarbonization, reduced demand of fossil fuel products, and strategies to reduce its overall GHG emissions (Ballesteros and Troncoso, 2023). The Federal Electricity Commission (CFE) has advanced in diverse strategies to support climate action and energy transition plans, creating the Center for Development and Training in Renewable

Energies to deploy renewable energy investments and increase green hydrogen production (CFE, 2022).

Public Financing

Mexico has issued thematic sovereign bonds through the Secretariat of Finance and Public Credit. In 2022, the government issued BONDESC, its first local-currency sustainable sovereign bond, marking progress in its sustainable debt market. The government targeted these bonds to social equality and climate action (Secretaría de Hacienda y Crédito Público, 2022).

Green Taxonomies

Mexico introduced its Sustainable Taxonomy in March 2023. It focuses on climate change, gender equality, and access to essential services related to sustainable cities in its initial stage, making Mexico a pioneer in addressing environmental and social concerns. The taxonomy will be periodically updated to align with the country's economic, social, and technological needs (Secretaría de Hacienda y Crédito Público, 2023b).

Influence on the Design of Regulation

The Ministry of Finance, with the National Banking and Securities Commission (CNBV) and other related entities, has made considerable efforts to encourage climate change financial risks reporting by financial entities, enhancing environmental, social, and governance (ESG) reporting to identify exposure to climate and social risks as well as investment and risk measurement frameworks (González et al., 2022). Additionally, the Mexican Stock Exchange (BMV) has launched a new ESG index—the S&P/BMV Total Mexico ESG Index—that tracks the performance of the 50 largest companies listed on the BMV that have the highest ESG scores (Hablemos de Bolsa, 2022). Moreover, the Central Bank established a Sustainable Finance Committee and SDG Sovereign Bond Framework, which sets the rules and procedures for the issuance of sovereign bonds linked to the UN's Sustainable Development Goals (SDGs) (Secretaría de Hacienda y Crédito Público, 2023a).²²

²² The goal of this framework is to ensure that the resources obtained from the issuance of these bonds are used to finance projects and programs that contribute to the fulfillment of the SDGs in Mexico.

Analytical Frameworks and Capabilities

The Mexican government has launched its National Climate Change Strategy, which considers several actions to measure climate-related expenditure and set targets for increasing public investment in climate-related activities. In addition to the Sustainable Taxonomy, Mexico has also implemented climate change budget tagging to keep track of public expenditure on climate change (Delgado, Eguino, and Lopes, 2021).

3. Argentina

Allocation of Budgetary Resources to Finance Climate Actions

According to the Green Central Banking Scorecard assessment, the Central Bank of Argentina ranks lowest among G20 nations in adopting green policies. There has been no focus on assessing environmental sustainability in fiscal or monetary policies (Green Economy Coalition, n.d.). Support for fossil fuels is significant, mainly for production and consumption in power generation.

Environmental Tax Reforms

Argentina has promoted renewable energy through Law No. 26,190, established in 2006, and further expanded its efforts with Law No. 27,191 in 2015, providing various incentives for developing renewable energy sources. Meanwhile, the country's approach to pollution or waste is more fragmented, with general environmental regulations and potential provincial measures. Still, specific nationwide taxes targeting pollution or waste may not be as comprehensive.

Carbon Pricing

Argentina implemented a carbon tax on liquid fuels and certain solid products in 2018, gradually increasing rates for some items until 2028. The fuel oil, mineral coal, and petroleum coke tax has been progressively phased in since January 2019, starting at 10 percent of the total tax rate and increasing 10 percent annually until reaching 100 percent by 2028 (World Bank, 2023b). Argentina's carbon tax covers approximately 20 percent of national GHG; revenue distribution varies, including allocations to social security, infrastructure, and provincial funds (World Bank, 2023b).

State-Owned Enterprises

Yacimientos Petrolíferos Fiscales (YPF), the largest oil and gas company in Argentina, has been making considerable advances in its decarbonization and energy transition strategy. Besides its operations in the oil and gas sector, the company has been increasingly developing a corporate branch for electric and renewable energy, as well as a company focused on innovation and new energies (YPF, 2022). Additionally, the company has prioritized some SDGs in its strategic agenda.

Public Financing

Argentina has not issued sovereign green bonds, although some regional entities and cities have issued green and social bonds. However, the Argentinian Stock Exchange and Markets (BYMA) developed a guide and regulations for the issuance and listing of social, green, and sustainable bonds, fostering private and provincial bond issuance (BYMA, 2023).

Green Taxonomies

Argentina's Ministry of Economy has introduced Resolution 696/2023, formally adopting the National Sustainable Finance Strategy (ENFS). The ENFS aims to facilitate scalable methods for mobilizing resources to encourage public and private investments that align with the UN's SDGs and the 2030 Agenda, considering climate change adaptation and mitigation goals. The strategy encompasses five key areas: (i) regulatory framework; (ii) standardized language and taxonomy; (iii) information generation, transparency, reporting, indicators, and data analysis; (iv) incentives; and (v) sustainable financial instruments (Green Finance for Latin America and the Caribbean, 2023).

Influence on the Design of Regulation

Argentina's Ministry of Finance has demonstrated mixed efforts in shaping green regulation and fiscal policy. Recent initiatives, including the ENFS, reflect a push towards alignment with SDGs, encompassing efforts in regulatory standardization, transparency, and sustainable financing. The country has shown some initiatives to promote ESG considerations in the financial sector (Ministerio de Economía Argentina, 2022). For instance, Argentina's securities regulator, the Comisión Nacional de Valores (CNV), introduced guidelines encouraging listed companies to disclose ESG-related information in their annual reports. Additionally, various Argentine companies started publishing sustainability reports to showcase their ESG performance using voluntary

environmental and social risk guidelines (Ministerio de Economía Argentina, 2022). However, sustainable finance reporting in Argentina is still in its early stages.

Analytical Frameworks and Capabilities

To date, Argentina does not have a medium-term fiscal framework (MTFF). The National Budget Office formulates, programs, executes, and evaluates the Budgets of the National Public Administration. However, the entity does not keep track of climate change or energy efficiency expenditure. Furthermore, Argentina has not implemented any mechanism, classification, or budgetary marker that allows for the systematic and periodic tracking of the volume of budgetary resources allocated to actions that impact climate change.

4. Colombia

Allocation of Budgetary Resources to Finance Climate Actions

To address the COVID-19 pandemic, Colombia implemented a fiscal stimulus package of more than US\$27 billion. Despite a focus on green growth in the recovery package, there is little emphasis on reducing fossil fuel consumption, indicating a mixed picture for green recovery (Green Economy Coalition, n.d.). Moreover, due to social unrest in 2021, the government decided to freeze gasoline and diesel prices, with a cost of 3 percent of GDP in 2022. Since 2023, the government has been gradually reducing the gasoline subsidy.

Environmental Tax Reforms

Through Law 1715 of 2014, Colombia created a set of tax incentives to promote renewable energy and energy efficiency investments. However, the government must consider a more comprehensive approach to address other environmental and climate concerns, and the FM must implement additional tax efforts to increase financing toward different climate needs besides the energy sector.

Carbon Pricing

Colombia's carbon tax, established in 2016, covers carbon content in fossil fuels (except coal) and applies across various stages of the distribution chain. Up to 100 percent of obligations can be met with domestic offsetting credits. Law 2277, effective from 2023, allocates 80 percent of tax revenue to coastal erosion management, water source

conservation, and ecosystem protection, reflecting climate commitments (World Bank, 2023b). An approved reform in 2022 increased the tax rate and extended it to more fossil fuels, alongside a gradual inclusion of thermal coal. The tax rate applied for coal will be 25 percent of the total value in 2025 and 100 percent of the entire tax in 2028. The reform also introduced a 50 percent offset allowance.

In 2018, Colombia enacted a climate change law, establishing an ETS called the National Program of Tradable Greenhouse Gas Emission Quotas (PNCTE). The Ministry of Environment will set emission allowances, allocated through auctions, and fines for non-compliance. Auction proceeds will fund environmental initiatives. Voluntary emissions reductions can also be recognized (World Bank, 2023b). The Climate Action Law (2021) aims for full ETS implementation by 2030, requiring emissions reporting and forming an expert group to promote carbon markets.

State-Owned Enterprises

Ecopetrol, the largest Colombian company, is the first oil and gas company in LAC to announce a net-zero emissions goal by 2050 (Ecopetrol, 2021b). In 2021, Ecopetrol became the largest shareholder of ISA in Colombia, one of Latin America's largest electricity transmission companies. This investment represents a transformative step in its energy transition toward decarbonization (Ecopetrol, 2021a). Ecopetrol is emerging as a prominent player in the energy transition in the region, encompassing a diverse portfolio spanning the hydrocarbon value chain, renewable energy, infrastructure, and nature-based solutions. Besides Ecopetrol, other SOEs are increasing their investments and strategies to reduce GHG emissions and achieve carbon neutrality.

Public Financing

In September and October 2021, Colombia issued its first sovereign green bonds in the local market for an amount of COP 1.5 billion, with a maturity of 10 years (World Bank, 2022a). Moreover, in 2022, the government adopted the Framework of Reference for Colombia's Sovereign Green, Social, and Sustainable Bonds.

Green Taxonomies

In 2022, the Ministry of Finance published a green taxonomy that supports various stakeholders from the public and private sectors, both local and international, and any entity interested in green or environmentally sustainable investments in Colombia. The

Colombian green taxonomy covers seven industries: energy, construction, waste management and emission capture, water supply and treatment, transportation, information and communication technologies, and manufacturing (Ministerio de Hacienda y Crédito Público, 2022).

Influence on the Design of Regulation

In recent years, there has been increased awareness about the importance of sustainable finance reporting among Colombian financial institutions, investors, and other stakeholders. The Financial Superintendence of Colombia (SFC) has been working on guidelines and initiatives to encourage greater transparency and disclosure of ESG-related information by financial institutions (SFC, 2022). Some banks and companies have started voluntarily disclosing ESG information in their annual reports, sustainability reports, or websites. However, Colombia's regulatory framework for sustainable finance reporting is still under development.

Analytical Frameworks and Capabilities

Colombia has been publishing its MTFF since 2004; since 2020, it has been considering energy transition and climate change perspectives. In the most recent version, the Colombian MTFF includes the financing strategy for climate change with various actions to continue strengthening and others to develop (Ministerio de Hacienda y Crédito Público, 2023). Furthermore, the Colombian National Statistics Department has been monitoring public expenditure on climate change. More significant efforts are required to reach investments closer to 2 percent of GDP, currently at 0.16 percent (Departamento Nacional de Planeación, 2022).

5. Chile

Allocation of Budgetary Resources to Finance Climate Actions

Chile's Ministry of Finance drives the country's green fiscal policies: creating taxes, subsidies, and fiscal incentives to address climate change. A notable step was the 2022 Climate Change Framework Law, which introduced a compensation system in collaboration with the Ministry of the Environment. Chile already employs a green tax on emissions and has plans for comprehensive instruments to change behavioral decisions, leading to considerably lower emissions as part of tax reforms (Cullell, 2022).

The Ministry of Finance also leads efforts to mobilize private resources, overseeing the Public-Private Green Finance Task Force for integrating climate considerations into financial sector decisions (Cullell, 2022). Additionally, the Ministry of Finance has begun designing green budgeting initiatives.

Environmental Tax Reforms

Chile implemented green taxes on CO₂ emissions and pollutants from stationary and mobile sources in 2014. Government ministries, including Finance, Environment, and Transport, administer these taxes. Stationary source taxes began in 2017 and expanded through a Tax Modernization Law in 2020. The Framework Law for Climate Change also laid the groundwork for voluntary certification systems to address GHG emissions and water conservation (IMF, 2022a). Yet, Chile can increase its green tax base to channel additional resources for climate mitigation and adaptation efforts.

Carbon Pricing

Chile's carbon tax, part of the broader tax on air emissions from contaminating compounds, was established in 2014 to reduce fossil fuel consumption. It became effective in 2017, covering installations emitting 25,000 tCO₂ or more. Amendments in 2020 introduced offset options, effective February 2023, at a rate of US\$5/tCO₂. Chile's Energy Policy 2050 recommends a CO₂ price of US\$35/tCO₂ by 2030. The current carbon tax covers 29.4 percent of GHG emissions. Chile is also considering the introduction of an ETS.

State-Owned Enterprises

La Empresa Nacional del Petróleo (ENAP) has shown substantial commitment to transitioning to cleaner energy sources and collaborating on green hydrogen initiatives in Chile. Alongside investments in renewables, ENAP has implemented energy efficiency measures and emissions reduction strategies. Although commendable, ENAP could accelerate its transition by setting more ambitious emission reduction targets and expanding its renewable projects (ENAP, 2024).

Public Financing: Use of Thematic Bonds

In 2019, the government of Chile issued sovereign green bonds totaling US\$2.4 billion, the first ever issued in the Americas. The government used the bond proceeds to finance projects promoting sustainable development, such as renewable energy, energy

efficiency, and climate change adaptation (Ministerio de Hacienda, 2019). Moreover, in 2023, the Ministry of Finance placed sustainability-linked bonds worth US\$2.25 billion, becoming the first country worldwide to include gender equality commitments (Ministerio de Hacienda, 2023b).

Green Taxonomies

Chile does not have a green taxonomy. Nonetheless, in 2021 Chile's FM published a roadmap for developing a taxonomy to foster green investments in the country (Climate Bonds Initiative, 2021b). Additionally, in August 2023, the Ministry of Finance published a structural framework that outlines the environmental goals and the rules for activities to be considered environmentally sustainable in the future taxonomy (Ministerio de Hacienda, 2023a).

Influence on the Design of Regulation

The Superintendency of Securities and Insurance (SVS), Chile's securities regulator, has been working on initiatives to enhance transparency and disclosure of ESG-related information by companies and financial institutions (Bertrand-Galindo and Püschel, 2023). Chile published its Climate Change Financial Strategy and has made progress in sustainability reporting, with some companies voluntarily disclosing ESG information in their annual reports, sustainability reports, and corporate websites. Nonetheless, Chile requires stricter and more comprehensive regulations to ensure that public and private sector companies disclose climate change risks and sustainability efforts.

Analytical Frameworks and Capabilities

The Ministry of Finance of Chile is collaborating with the Budget Directorate and the United Nations Development Programme (UNDP) to develop a fiscal framework for measuring public expenditure on climate change. The goal is to measure expenditures and impact on mitigation and adaptation (Cullell, 2022).

6. Peru

Allocation of Budgetary Resources to Finance Climate Actions

Peru's fiscal policies aim to discourage fossil fuel consumption through excise taxes, focusing on cleaner fuels and environmentally friendly practices. Incentives for renewable energy investment—such as reduced taxes on certain vehicles and subsidies

for rural renewable energy projects—are in place, promoting sustainability, economic growth, and biodiversity conservation (UNEP and GIZ, 2017). However, Peru still maintains considerable fossil fuel subsidies of approximately 1 percent of national GDP (IMF, 2022b). A more coordinated and comprehensive green fiscal policy is required (Green Economy Coalition, n.d.).

Environmental Tax Reforms

Peru has actively promoted renewable energy and environmental protection through various fiscal measures. The country's renewable energy promotion law grants investment incentives such as accelerated depreciation for renewable energy assets, tariff reductions for renewable energy equipment, and renewable energy auctions. Energy efficiency is also promoted through standards and tax incentives (Osinergmin, 2019). Additionally, Peru has pursued other fiscal measures like taxing air pollutants and implementing fees for water usage in specific sectors, reflecting a broader commitment to environmental protection and sustainable development.

Carbon Pricing

Peru does not have a carbon tax or an ETS in place. In 2018, the Ministry of Environment (MINAM) released a proposal for a carbon tax, but the proposal was not adopted.

State-Owned Enterprises

Petroperú, one of the largest Peruvian SOEs, has made significant advancements in overhauling its strategic direction, transitioning from an oil-focused entity to an energy-centric company (Petroperú, 2024). However, the company is still in the early stages of this new direction. Other Peruvian SOEs are also beginning to incorporate specific strategies and resources to accelerate energy transition and climate change efforts.

Public Financing

In 2021, the Ministry of Economy and Finance issued the first sovereign bonds, aligned with the pillars of the Green Bond Principles and the Sustainable Bond Guide, for US\$2.5 billion and US\$1 billion, maturing in 2034 and 2072, respectively (MINAM, 2023).

Green Taxonomies

Peru does not have a green taxonomy. MINAM has been developing a classification system for environmental finances based on nature-friendly economic activities, thereby contributing to mobilizing public and private capital towards sustainable investments.

Influence on the Design of Regulation

Peru's sustainable finance regulations require financial entities to report social and environmental risks and corporate governance to the Stock Market Superintendence (SBS). However, the regulation lacks specific mandates for disclosing governance aspects of ESG and climate matters and does not cover all financial market participants (MINAM, 2022). While the regulation mentions ESG evaluation, implementation remains voluntary. Enhancing guidelines for all economic segments to include environmental and social risks and follow international standards is vital (MINAM, 2022). Piloting ESG and climate integration into international accounting standards and asset impairment with financial entities is an identified opportunity for the Peruvian market.

Analytical Frameworks and Capabilities

Peru has an MTFF known as the Multiannual Macroeconomic Framework (MMM), which outlines macroeconomic projections and assumptions for four years, aiming to establish a prudent, responsible, transparent, and predictable framework. Its purpose is to facilitate tracking, accountability, and management of the non-financial public sector while considering fiscal risks. However, the MMM only recognizes the urgent need to finance climate change and analyzes the economic outlook of some critical minerals. Peru has implemented climate change budget tagging to track financial resources allocated to climate change programs and projects (Delgado, Eguino, and Lopes, 2021).