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Unlocking Climate Finance in Asia-Pacific

Transitioning to a Sustainable Future

Prepared by Cheng Hoon Lim, Ritu Basu, Yan Carrière-Swallow, Kenichiro Kashiwase, Mahmut Kutlukaya, Mike Li, Ehraz Refayet, Dulani Seneviratne, Mouhamadou Sy, and Ruihua Yang

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Acronyms and Abbreviations

AE	advanced economy
ASEAN	Association of Southeast Asian Nations
EMDE	emerging and developing economy
ESG	environmental, social, and governance
GHG	greenhouse gas
ISSB	International Sustainability Standards Board
MDB	multilateral development bank
PFM	public financial management
RST	Resilience and Sustainability Trust
TCFD	Taskforce on Climate-Related Financial Disclosure

Executive Summary

Asia-Pacific's transition to a sustainable future has global economic significance. The region is the engine of global growth, but its heavy reliance on coal as an energy source means that it is responsible for more than half of current global greenhouse gas emissions. Asia-Pacific countries have pledged to curb their carbon emissions. Achieving these commitments will require substantial investments over the next decade. Emerging and developing Asia will need at least $1.1 trillion annually for climate mitigation and adaptation investments. Actual investment falls short by $800 billion. The region's environmental performance also hampers its ability to tap into private flows from the fast-growing environmental, social, and governance asset class, keeping the cost of issuing sustainable debt relatively high compared to other regions. With fiscal space constrained by public debt accumulated during the global pandemic, there is an urgency to confront these challenges and mobilize private capital for climate financing.

This paper draws on an in-house survey of countries in the Asia-Pacific region to better understand the needs of the region and the issues they face in unlocking climate finance. It describes three major challenges: (1) persistent large gaps in data, disclosures, and taxonomies that hinder climate risk reporting and analysis, undermining investor confidence in directing private investments toward climate action; (2) conflicting national policy approaches—such as the introduction of carbon taxes amid widespread subsidization of fossil fuels—that are compounded by inadequate institutional coordination and oversight; and (3) a complex global environment with increasing geoeconomic fragmentation, which threatens to imperil collective and cooperative action on climate change.

Overcoming these challenges will require a coordinated and multipronged approach, involving governments, central banks, financial supervisors, the IMF, and other multilateral institutions:

- *Governments* should focus on (1) establishing a comprehensive strategy with strong institutional oversight and coordination to enhance the framework on data, taxonomies, and disclosures, and (2) phasing out fossil fuel subsidies and expanding carbon pricing to create fiscal space—to garner public buy-in, revenues generated should be recycled to promote investment in green technology, jobs, and growth, while supporting vulnerable households; and (3) strengthening macroeconomic and public investment management to keep risk premiums and funding costs low, generate economic dividends, and attract private capital.

- *Central banks and financial supervisors* should coordinate across jurisdictions to (1) support the adoption of global and interoperable disclosure standards to enhance transparency and consistency; (2) strengthen climate risk analyses and reporting, and incorporate climate-related financial risks into prudential frameworks; and (3) develop climate labels for sustainable investment funds and shift the focus of environmental, social, and governance scores to better capture sustainability and climate impact to foster trust in the evaluations.

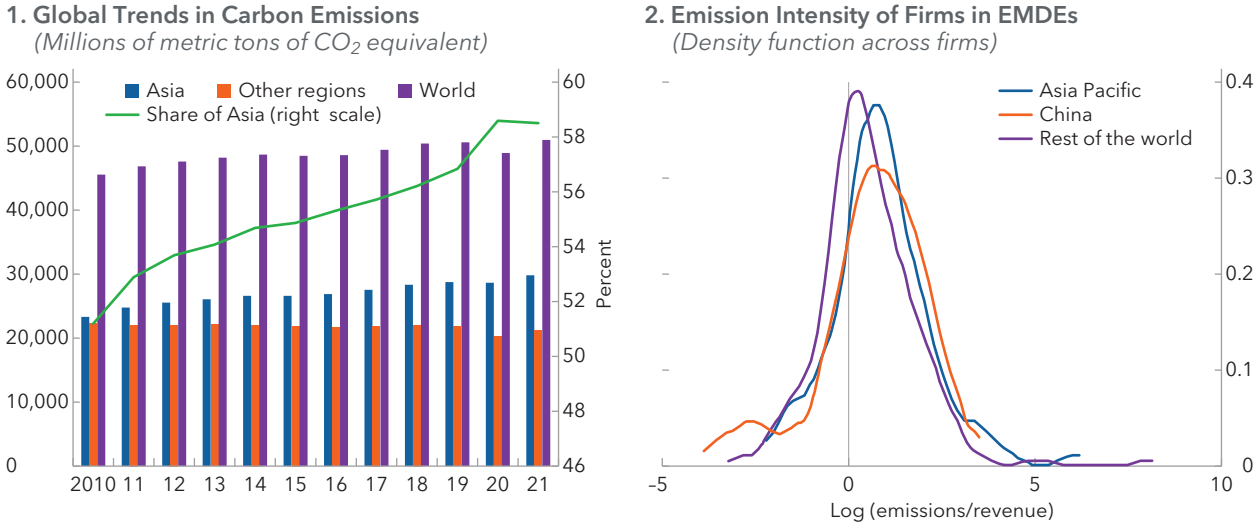
- *The IMF, together with other multilateral institutions*, can support climate actions by (1) covering macro-critical climate-related risks and policies in surveillance and lending activities; (2) contributing to the reduction of climate financing gaps through the catalytic and reform supporting functions of the Resilience and Sustainability Trust; (3) strengthening data and statistics—including through capacity building and peer learning—to develop common standards around climate risk measurement and analysis; and (4) scaling up grant financing and concessional lending, and where appropriate adopting risk-mitigating mechanisms to expand lending capacity. Cooperation among multilateral institutions is essential to align efforts and resources to achieve a balanced allocation between mitigation and adaptation lending.

1. Introduction

The Asia-Pacific region powers the global economy and is responsible for a rising share of global carbon emissions. Contributing more than 70 percent of global growth in 2023, Asia-Pacific economies rely heavily on coal as an energy source. In 2021, the region's share of global carbon emissions exceeded 58 percent, and its emission intensity—as measured by the production of firms headquartered in the region—is higher compared with peers in other regions (Figure 1). Although per capita emissions remain relatively low, and the region's historical contribution to the stock of carbon in the atmosphere is very small, Asia-Pacific's share of emissions is expected to continue rising in the absence of a shift in policies.

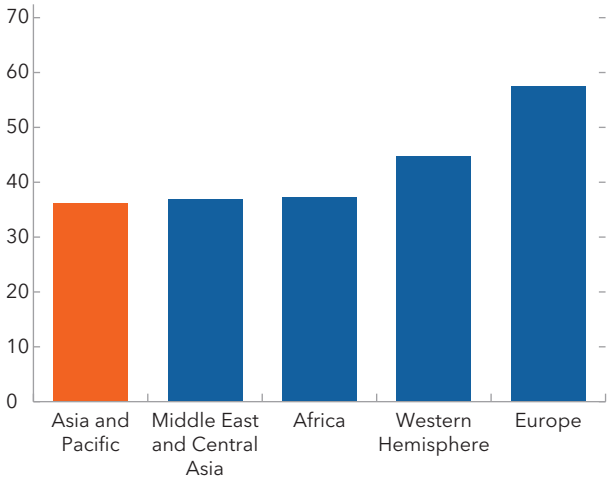
Asia-Pacific countries have declared strong intentions to decarbonize their economies. They have announced their Nationally Determined Contributions in the context of the 2015 Paris Agreement and subsequently upgraded their ambitions to reduce their carbon emissions in the coming decades. However, to achieve the goal of net zero greenhouse gas (GHG; carbon dioxide) emissions by 2050, which aligns with 1.5 degrees Celsius warming (IPCC 2022), these commitments to high-impact action must be strengthened, especially in view of Asia's environmental performance (Figure 2). In addition, the multiplicity of recent shocks, including the COVID-19 pandemic, high inflation and its implications for monetary policy and capital flows, as well as rising geopolitical fragmentation, could have profound implications for energy security and the global economy, slowing the transition to a low-carbon economy and coal phaseout. Under these circumstances, decarbonization and coal phaseout strategies must be accompanied by policies that support vulnerable regions and populations.

Figure 1. Carbon Emissions



Sources: Capelle and others 2023 based on data from ICE Data Services; and IMF Climate Change Indicators dashboard.
Note: In panel 2, the figure plots the kernel density of the log of emissions over revenues for EMDEs separating firms headquartered in Asia-Pacific versus the rest of the world, after controlling for industry-year fixed effects and firm size. Four-digit Standard Industrial Classification and the reporting year 2022 are used. Firms in the financial, utilities, and energy sectors are excluded. CO_2 = carbon dioxide; EDMEs = emerging market and developing economies. Eq = equivalent.

Figure 2. Asia: Environment Performance Index



Sources: Columbia University; Yale University; and IMF staff calculations.
Note: Scores range from 0 to 100, from worst to best.

There is an urgent need to mobilize climate finance[1] in Asia-Pacific. The region's high population density and geography leave the region highly vulnerable to climate change–related hazards. Rising sea levels from global warming are eroding arable land in low-elevation coastal zones, and together with typhoons are posing a severe risk for rural incomes, food security, and commodity exports. By mid-century, rising waters will impact nearly a billion people in the region (Dabla-Norris, Nozaki, and Daniel 2021). For some Pacific island countries, this risk is existential. In contrast, the region has yet to build adaptive capacity through investments in resilient infrastructure, early warning systems, health and education, and targeted social safety nets. Mitigation efforts aligning with Asia's Nationally Determined Contributions are also lagging. IMF (2022a) estimates that, under an optimal scenario for carbon reduction, emerging market and developing economies (EMDEs) in Asia alone would need more than $1.1 trillion per year to finance investments in both climate change mitigation and adaptation.[2]

This paper explores how Asia-Pacific countries can unlock climate finance to support their transition to a lower carbon intensity economy. It draws on an in-house survey of country authorities, which was sent to member countries by the IMF Asia-Pacific Department in late 2022. Responses to 16 questions related to climate finance were provided by officials from 12 Asia-Pacific countries, with the key findings reported in Annex 1. The survey findings have offered important insights into the challenges facing the region, although they may not apply to all countries in the region and policy considerations will need to be tailored to country-specific circumstances. The paper also draws from IMF *Global Financial Stability Reports*, which consider the challenges of scaling up climate finance in EMDEs (IMF 2022a, 2023b) and many recent IMF studies on climate issues.

The paper is structured as follows. The first section describes the current state of climate finance in the Asia-Pacific region and highlights several notable trends in the flows of climate financing toward mitigation and adaptation purposes. Although conventional financing may also flow into climate projects, it is not considered in this paper because in the absence of proper taxonomies and principles, they are hard to accurately measure and may be prone to greenwashing concerns. The second section discusses the challenges and constraints that impede the mobilization of climate finance in the region, drawing heavily on the in-house survey. The last section recommends policy actions to unlock climate finance for three key decision makers: national governments, financial sector supervisors and central banks, and the IMF and other multilateral institutions.

[1] The term "climate finance" is used in line with IMF (2023d) and Asian Development Bank (2023), as opposed to the broader "sustainable finance" that considers environmental, social, and governance considerations.

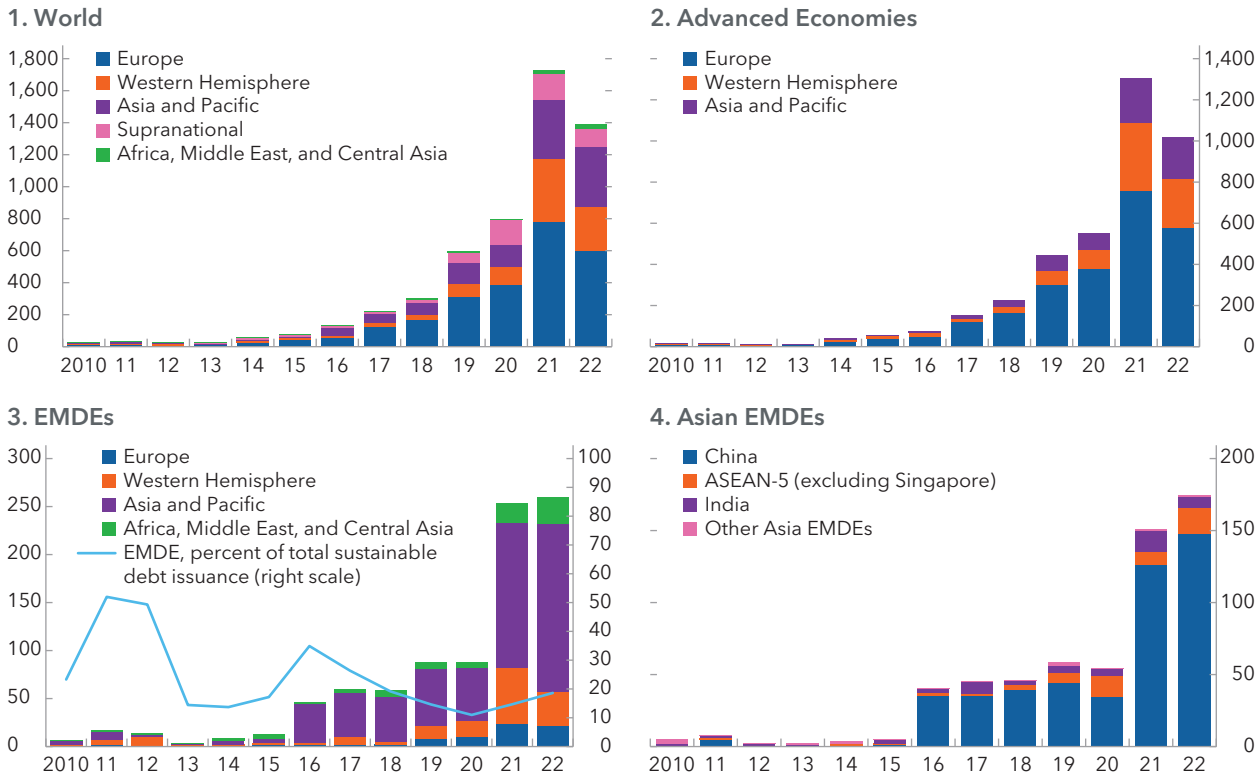
[2] The underlying assumptions underpinning this estimate are explained in the Online Annex of IMF (2022a). Although gross financing needs for the low-carbon transition are large, the incremental economic cost of the low-carbon transition versus realistic business-as-usual scenarios are generally estimated to be smaller.

2. Asia-Pacific's Climate Finance Ecosystem

A. The Current State of Play

In the past two years, global sustainable debt issuance has seen remarkable growth, doubling from $800 billion in 2020 to $1.6 trillion in 2022. Asia-Pacific accounted for roughly 25 percent of the total, surpassing $350 billion in 2022 or roughly 1.3 percent of regional GDP (Figure 3). This issuance has been split evenly between EMDEs and advanced economies (AEs) in contrast to other regions where AEs dominate. In EMDE Asia, China alone is responsible for more than 85 percent of the sustainable debt issuance, totaling about $140 billion in 2022 (0.7 percent of GDP). The Association of Southeast Asian Nations (ASEAN) economies and India together contribute nearly 15 percent (ranging from 0.2 to 0.7 percent of GDP). The situation, however, is starkly different for Asia-Pacific's developing economies where flows have been alarmingly low, constituting less than 1 percent of EMDE Asia's sustainable debt issuance, reflecting in part the low share of adaptation financing in total climate finance as well as the many challenges facing countries with weak access to international capital markets.

Figure 3. Global Sustainable Debt Issuance, by Region
(Billions of US dollars)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: ASEAN-5 = Indonesia, Malaysia, Philippines, Singapore, and Thailand; EDMEs = emerging market and developing economies.

Debt is the main instrument of sustainable financing in Asia-Pacific and is largely used to support mitigation activities (Box 1). Sustainability-linked loans and bonds have grown quickly in AE Asia and now account for a higher share of issuance than green bonds (Figure 4).[3] The opposite is true for EMDE Asia, where green bonds dominate debt issuance, led by strong investor appetite in China. A significant share of investment grade green bond issuers is also domiciled in China, amounting to about 15 percent of total green bonds. In addition, more than 80 percent of climate financing flows (and 88 percent of loan flows) to the region are directed to mitigation activities. Financing of climate adaptation is much more limited and totaled less than $30 billion per year in 2019–20, or about 0.1 percent of regional GDP. The Pacific island countries are an exception, where financing has predominantly come in the form of grants (83 percent) and with a higher share allocated for climate adaptation in view of their negligible contribution to global emissions. Much of this has come from the Green Climate Fund, which was established under the UN Framework Convention on Climate Change and maintains a 50/50 balance between mitigation and adaptation. Nevertheless, despite the recent growth, Asia-Pacific's sustainable debt issuance remains a small share of total debt issuance in the region, and only about 1 percent of the world's total debt issuance.

Box 1. Sustainable Debt Instruments: A Brief Overview

Several classes of bond instruments have emerged in the sustainable finance ecosystem:

- *Green bonds* are a debt security whose proceeds are used exclusively to finance projects that have positive environmental impact. Use of proceeds is verified and can subject the issuer to penalties.
- *Sustainability bonds* finance projects with both positive environmental and social impact. Use of proceeds is verified and can subject the issuer to penalties.
- *Sustainability-linked bonds* have issuers commit to achieving predetermined sustainability performance targets, measured using indicators such as greenhouse gas emissions. Although the use of proceeds is not constrained, the issuer receives a bonus or pays a penalty if the target is met or missed.
- *Social bonds* aim to achieve social benefits such as improvements in health and education.

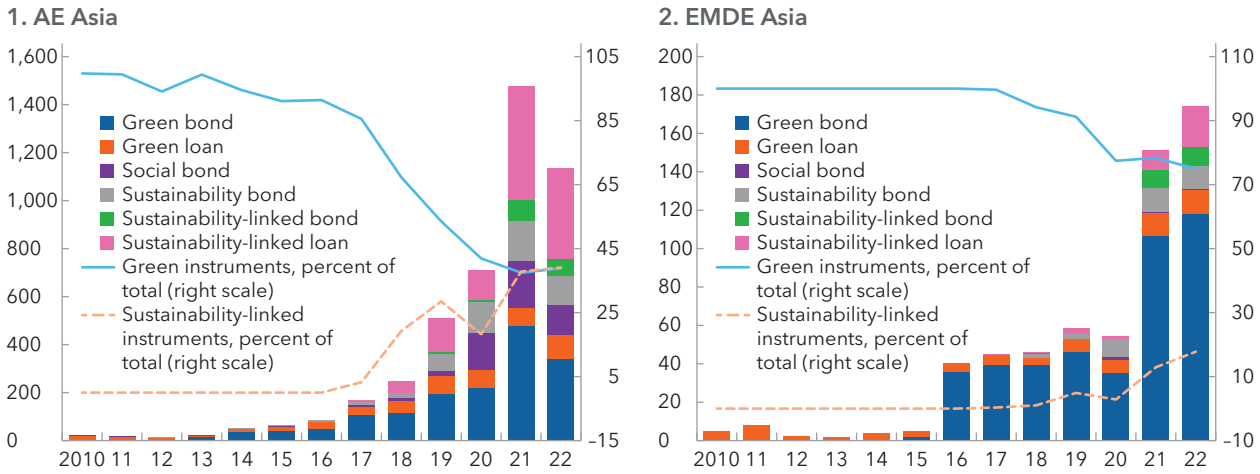
Two classes of loans have also emerged as the most common loan instruments in the sustainable finance ecosystem:

- *Green loans* are a credit facility offered to a borrower for environmental purposes approved by the lender.
- *Sustainability-linked loans*, like sustainability-linked bonds, emphasize improvements in the sustainability performance of the borrowing entity.

As in any innovative financing instrument, standardization is crucial to ensure market development. If underlying targets or commitments are not sufficiently ambitious or penalties for missing the targets are not sufficiently strict, then the associated instruments are unlikely to convince climate-conscious investors. Taxonomies in some jurisdictions have facilitated the development of robust standards for bonds that promote transparency. For example, the Social Bond Principles seek to support issuers in financing socially sound and sustainable projects that achieve greater social benefits, thus providing transparent social credentials alongside an investment opportunity (ICMA 2023).

[3] The development of sustainability-linked debt in Asia was supported by the adoption of the Green Loan Principles in December 2018, which were developed by the Loan Market Association, the Asia Pacific Loan Market Association, and the Loan Syndications and Trading Association. These voluntary guidelines seek to provide clarity and consistency on what constitutes a green loan.

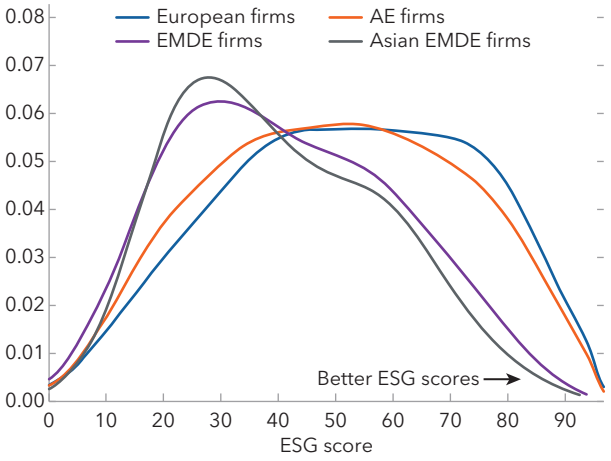
Figure 4. Debt Issuance, by Instrument
(Billions of US dollars)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: AE = advanced economy; EMDE = emerging market and developing economy.

Equity funds play a much smaller role in Asia-Pacific's climate finance ecosystem, a situation similar to other EMDEs. Environmental, social, and governance (ESG) investing has evolved rapidly at the global level, with more than 30 percent of global assets under management now comprising ESG funds (IMF 2022a), and more than half of this allocated to equity investments. In contrast, ESG flows to EMDE Asia are lagging other investments. Although EMDE Asia makes up about 10 percent of global assets for non-ESG funds, these assets make up only 2 percent for ESG funds. One contributing factor may be the less-than-comprehensive corporate disclosures by EMDE Asia that penalize their ESG scores (Figure 5). If Asia's share of global ESG funds were to rise to the region's share of overall funds—that is, about 10 percent of global assets—this would generate about $500 billion per year in inflows to the region.[4] That said, current methodologies of ESG rating agencies do not reward EMDEs that implement climate policies. Analysis presented in the October 2023 *Global Financial Stability Report* shows little correlation between ESG ratings and environmental performance as only a relatively small subset of data points are related to creating ESG impact.[5] Nevertheless, in the absence of credible alternative climate impact scores, ESG ratings remain important guides for fund managers in allocating their pool of assets under management.

Figure 5. ESG Scores of Firms Headquartered in Asian EMDEs
(Density function across firms)

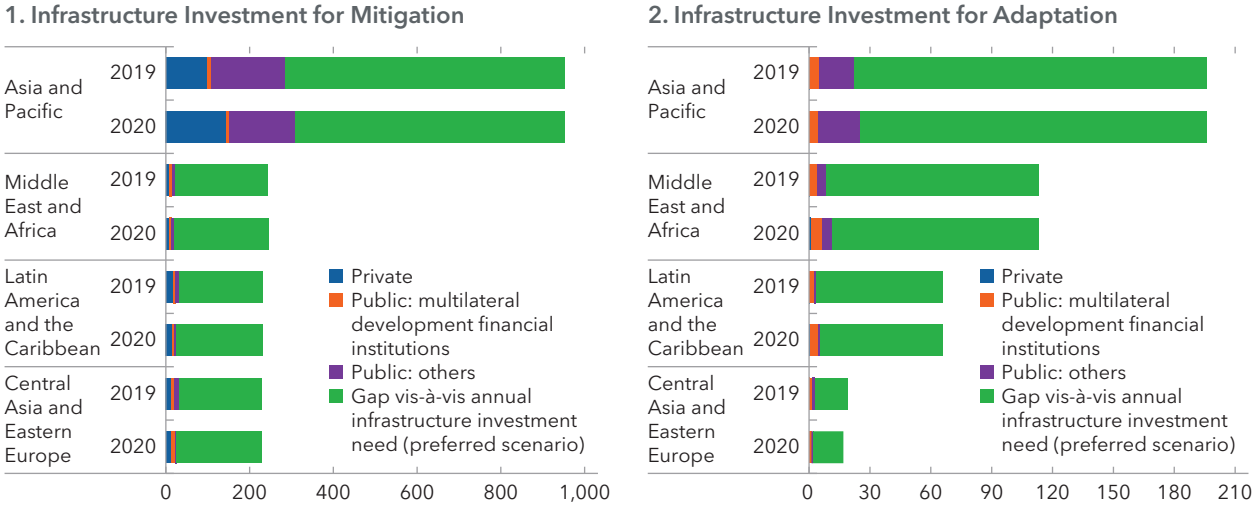


Sources: Refinitiv; and IMF staff calculations.
Note: The figure shows a smoothed distribution function of the ESG scores based on listed firms—more than 6,200 in total, of which more than 1,300 are from EMDEs. AE = advanced economy; EMDE = emerging market and developing economy; ESG = environmental, social, and governance.

[4] This is an IMF staff estimate using underlying data from Lipper Data.

[5] For example, a firm operating in the fossil fuel industry with high carbon intensity could have a better environmental, social, and governance (ESG) score, since these are constructed to measure its performance relative to firms within the same industry. Refinitiv's "E" score uses 64 variables with equal weights, but only 16 variables directly reflect the climate impact. Elmalt, Kirti, and Igan (2021) also find a limited link between ESG scores and carbon emission performance at the firm level, suggesting limited scope for these scores to guide investments that would lead to meaningful economywide mitigation of carbon emissions.

Figure 6. Global Climate Finance Flows and Investment Needs, by Destination Region
(Billions of US dollars)



Sources: Emissions Database for Global Atmospheric Research; IMF 2022a, based on 2021 data from the Climate Policy Initiative; IMF, World Economic Outlook database; Notre Dame Global Adaptation Index; and IMF staff calculations.
Note: Panel 1 shows the infrastructure needs for mitigation that include the energy and transport sectors. Panel 2 shows infrastructure needs for adaptation that include the water and sanitation, irrigation, and flood protection sectors. Climate finance flow includes all instruments for both emerging market and developing economies and advanced economies in selected regions while the infrastructure investment needs are calculated for emerging market and developing economies. Therefore, the infrastructure needs gap is likely to be underestimated. Private flows are small, consistently below $1 billion dollars.

Most of the climate finance comes from public sources or raised by the public sector, but private financing is catching up. Private financing is now estimated to make up about 40 percent of total climate financing in Asia (Figure 6). Recent examples of public initiatives are intended to explicitly crowd in private participation. For example, the Just Energy Transition Partnerships aim to mobilize $20 billion from a group of AEs co-led[6] by Japan and the United States to phase out coal-fired power plants in Indonesia. The Just Energy Transition Partnership in Vietnam will also aim to mobilize an initial $15.5 billion of public and private finance during the next three to five years for the country's green transition. Although the details of its implementation are still being finalized, a large share of the blended financing package is intended to come from private sources. Similarly, the Green Climate Fund has become the dominant global climate fund for small and fragile states such as the Pacific island countries. Between 2014 and 2019, the Green Climate Fund approved $3.3 billion for adaptation and mitigation projects in the Pacific island countries, although total disbursements have amounted to only a quarter of annual adaptation needs (Fouad and others 2021b).

Innovative financial instruments are also picking up in the region. The Asian Development Bank announced in May 2023 an Innovative Finance Facility for Climate in Asia and the Pacific and is developing an Energy Transition Mechanism that will support the phaseout of coal-based energy in the near term. Over an initial five-year period, the Innovative Finance Facility for Climate in Asia and the Pacific is expected to raise $3 billion in guarantees from financing partners, which could enable as much as $15 billion for new climate-related projects in the region. The World Bank has also rolled out an Innovative Finance Facility for Climate-Amundi $2 billion EMDE green bond fund to leverage private capital in the region. Similarly, when designed well, carbon offsets can be an important element of the mitigation toolkit to enable a transition to a low-carbon economy. Asia is currently the world's leading producer of carbon offsets (Box 2).

[6] At the Group of Twenty Leaders' Summit, Indonesia and leaders of the International Partners Group, co-led by Japan and the United States, and including Canada, Denmark, the European Union, France, Germany, Italy, Norway, and the United Kingdom, launched a partnership in support of ambitious new targets for Indonesia's just energy sector transition. The just transition challenge—of greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities, and leaving no one behind—is an important dimension of climate finance in the region, for instance, given the coal phaseout issue (see IEA 2022a, Chapter 5) and employment bottlenecks in the energy sector (see IEA 2022b).

Box 2. Carbon Offsets in Asia-Pacific

Carbon offsets, a use case for carbon credits, are tradable certificates that provide a means for polluters to compensate for their own emissions by investing in projects that reduce or remove greenhouse gas emissions elsewhere (Calel and others 2021).[1] By purchasing carbon offsets, entities can effectively balance out their own carbon footprint. Offsets thus provide a mechanism for all sectors to contribute to overall decarbonization, by allowing firms with higher abatement costs to cross-subsidize those with lower abatement costs. On the one hand, efficient and well-designed carbon offset regimes can increase the competitiveness of green investments by improving the financial margins of viable projects as well as expanding the universe of viable projects.[2] On the other hand, in the absence of coordinated regulation and a corresponding verification mechanism that can ensure the integrity of the offsets, a large supply of low-quality offsets can lead to economically inefficient transfers and potentially lead to an increase in global emissions.[3] In principle, these schemes can operate across borders, providing a mechanism for channeling resources from advanced economies to emerging market and developing economies with lower costs of carbon abatement.[4] These schemes can include renewable energy installations, reforestation efforts, methane capture projects, and energy efficiency initiatives, among others.

Asia is currently the world's largest producer of carbon offsets, producing 44 percent of the $2 billion global market in 2021. With a large potential for cross-border inflows to finance the green transition in Asia, many jurisdictions in the region have recently launched carbon exchanges (Hong Kong SAR, Malaysia, Singapore, Thailand), while several others are in various stages of development (China, India, Indonesia, Japan, Korea). Ensuring that offsets effectively lead to carbon reductions requires coordinated regulations, standardization of contracts, and a verification mechanism that can ensure their integrity. Therefore, continued progress on developing these markets will contribute to an efficient transition, with market forces allocating funds to efficient climate solutions that reduce global emissions.

[1] Article 6 of the Paris Agreement allows countries to voluntarily cooperate with each other to achieve emissions reduction targets set out in the Nationally Determined Contributions. Specifically, Article 6.4 establishes a mechanism for trading greenhouse gas emission reductions between countries under the supervision of the Conference of the Parties.

[2] For example, carbon offset revenue should flow only to projects that satisfy additionality, whereby an otherwise economically unviable project becomes viable due exclusively to offset revenue. A project that is economically viable independent of offset revenue would not satisfy the additionality condition.

[3] Probst and others (2023) estimate that only 12 percent of the total volume of existing credits constitute real emissions reductions.

[4] The average price of a renewable energy offset traded at about $2 per ton in 2021.

B. Is There a Financing Gap?

Given the size of investment needed for Asia's low-carbon transition and the current inflows of climate finance, there remains a large financing gap. The gap is estimated to be approximately $600 billion per year for mitigation, including for infrastructure investments in clean energy sources[7] (Figure 6). Financing needs and gaps for climate adaptation are difficult to pin down but are estimated to reach about $200 billion per year in Asia-Pacific, including about $1 billion for the Pacific island countries (Fouad and others 2021b).

[7] The International Energy Agency estimates the average annual investment in clean power, grids, and energy end use in climate-driven scenarios alone to cost more than $150 billion per year by 2030 in EMDE Asia excluding China (IEA 2021), while its previous year's estimate was more than $375 billion per year.

To fill these gaps, financing for climate mitigation and adaptation will need to be scaled up. Financing needs far exceed the public sector capacity, and therefore private capital must be scaled up to close the substantial financing gap. Bhattacharya and others (2022) estimate that private financing must at least double between 2019 to 2025 for an incremental $395 billion. To put this into perspective for Asia, the region only received about $140 billion in private capital in 2020. Moreover, filling the gap for adaptation financing will require continued public sector support as investments in climate adaptation are typically viewed as public goods that do not generate a continuous and visible income stream to attract private capital.

However, the cost of issuing sustainable debt instruments is high, reflecting Asia-Pacific's weaker environmental performance. Investors have not yet demonstrated a willingness to pay a premium to hold green instruments ("greenium"), such as a green bond over a conventional bond, by accepting lower monetary returns in exchange for supporting environmentally friendly activities. As shown in the next section, Asia-Pacific sovereign issuance has not benefited from a significant greenium. The absence of a greenium may be symptomatic of broader challenges in the region that need to be addressed, pointing to the urgency of improving ESG practices and standards in the region. It is worth emphasizing that enhancing ESG performance could unlock greater financing opportunities, particularly in the form of equity investments or grants, which would not exacerbate the already high debt levels of many EMDEs, including in Asia.[8] Such financing channels have lagged in the region, and addressing the underlying ESG concerns could be pivotal in bridging the financing gap.

C. Does It Pay to Issue Green Bonds?

Green bonds are instruments that channel savings to borrowers who use the funds for environmentally friendly activities. Globally, 28 economies have issued sovereign green bonds since 2016, including eight from Asia-Pacific.[9] Most of these economies have strong track records of favorable access to global financial markets, and regularly issue conventional sovereign bonds. The process of issuing green instruments involves additional administrative costs compared to conventional sovereign bonds, and all sovereign issuers have green bond frameworks aligned with International Capital Market Association principles to ensure transparency, tracking, and reporting of the use of green bond proceeds.[10] From the perspective of the borrower, bearing these costs and constraints is justified by the proposition that investors in green bonds are willing to accept a somewhat lower return than they would on comparable sovereign debt, offering a lower cost of financing. Underpinning this argument is the notion that investors have intrinsic preferences for supporting green activities, and thus derive nonpecuniary benefits from holding the green instrument. However, empirical studies of the pricing of green bonds have found mixed results, with some studies finding evidence for a sovereign greenium—that is, a significant yield differential between a green bond and an otherwise identical conventional bond—while others do not.[11]

Market pricing of recently issued green bonds in the region has mirrored that of conventional bonds. Although no twin bonds have been issued by Asian sovereigns, India did issue two 10-year rupee-denominated bonds within five days of each other in early 2023, one of which was green. Figure 7, panel 1, plots

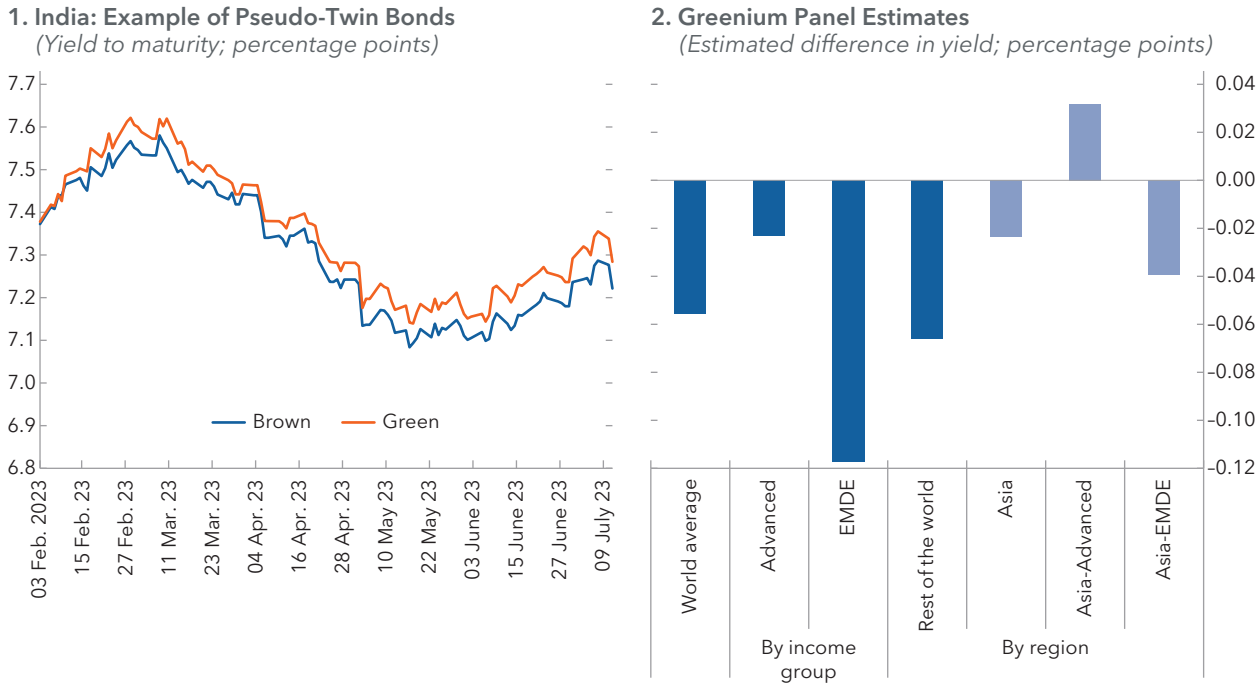
[8] Emerging market economies have added 9.7 percent and low-income countries 5.2 percent to their gross general government debt through larger fiscal deficits and below-the-line public loans, guarantees, and other support for firms (Bhattacharya and others 2022; IMF 2021a).

[9] Asia-Pacific Issuers include Fiji, Hong Kong SAR, India, Indonesia, Korea, New Zealand, the Philippines, and Singapore. Malaysia and Indonesia have also issued green sukuks.

[10] As discussed by Cheng, Ehlers, and Packer (2022), unlike newer sustainability-linked bonds, there are no financial penalties for the green bond issuer if the funds are not used for green projects or if they do not result in any environmental benefits.

[11] Using a narrower sample, Ando and others (2023) estimate an average greenium of about 4 basis points, which is larger in EMDEs. Baker and others (2022) also document evidence for a small greenium of a few basis points in a sample of US municipal bonds but found that the greenium is not present in primary issuance of twin bonds. Zerbib (2019) estimates a small negative greenium of about 2 basis points that is most pronounced for instruments issued by financial corporates and low-rated debtors.

Figure 7. Pricing of Asian Sovereign Green Bonds



Source: IMF staff calculations based on data from Thomson Reuters Eikon.
Note: Panel 1 compares secondary market yields of 10-year sovereign bonds denominated in Indian rupee. The green bond has ticker 968KJF and was issued on January 26, 2023, while the brown bond has ticker 9681RR and was issued on February 3, 2023. In panel 2, bars show estimated parameter $\hat{\beta}$ from equation (1) in the main text. Dark shade indicates statistical significance at the 95 percent confidence level. EMDE = emerging market and developing economy.

the evolution of the yield on these bonds in the secondary market since issuance. Strikingly, the yield on the conventional bond has tended to be a few basis points lower than the yield on the green bond, indicating the absence of greenium.

A significant greenium of almost 6 basis points is estimated in a global panel of sovereign bonds. Drawing on a large panel allows us to control for a rich set of bond characteristics and shocks and to compare results across groups of countries. To do so, we assemble a monthly panel of sovereign bonds i for which there is in circulation at least one conventional and one green bond issued by the same country j, denominated in the same currency d, and having remaining maturities that differ by no more than 18 months. These matching criteria leave us with 212 bonds issued by 23 economies, of which 5 are in the Asia-Pacific region.[12] The specification is as follows:

$$Y_{ijdt} = \alpha_{jdt} + \beta \cdot Green_i + \gamma \cdot BidAsk_{ijdt} + \theta \cdot Tenor_{ijdt} + \varepsilon_{ijdt}, \quad (1)$$

in which the bid-ask spread $BidAsk_{ijdt}$ captures the bond's liquidity, the remaining tenor $Tenor_{ijdt}$ controls for the role of duration and the term premium, and $Green_i$ is a dummy that denotes whether bond i is classified as "green" by the Climate Bond Initiative. Country-currency-time fixed effects α_{jdt} capture time-varying shocks to the domestic and global economy, including shocks from the monetary policy of the denomination currency's central bank. The coefficient β captures the average difference in yield between comparable green and conventional bonds, and estimates are reported in Figure 7, panel 2. An estimated parameter of 6 basis points suggests that investors indeed have a nonpecuniary motive to hold green instruments, which

[12] The sample contains both bonds and sukuks issued by Indonesia. The estimation sample contains 3,474 observations and spans the period of February 2018 to July 2023.

leads them to accept a lower return to finance green activities. Nevertheless, this estimate corresponds to only a modest reduction in interest costs for sovereign issuers, with the annual coupon on a $1 billion bond reduced by approximately $600,000.

Unlike other regions, Asia-Pacific sovereign issuances do not appear to have benefited from a significant greenium. The specification is expanded to allow the greenium estimate to vary across regions and income groups. The results show that the greenium is larger for EMDE issuers than for AE issuers but is significant in both groups. In the rest of the world outside Asia-Pacific, the average greenium is approximately 6.5 basis points—a result that is in line with the literature. In contrast, for Asia-Pacific issuers, the greenium is not statistically significant and the point estimate is slightly positive for AE issuers. This suggests that the green bonds issued by Asia-Pacific sovereigns have not led to lower interest costs than would have been obtained by issuing a conventional instrument.[13] With interest rates staying high as major central banks around the world tighten monetary policy to tackle inflation, addressing the challenges described in the following section may help to achieve more favorable pricing for Asia-Pacific sovereign green bonds issued in the future.

[13] Gao and Schmittmann (2022) propose a model that rationalize a zero greenium with the presence of asymmetric information, which gives issuers the ability to "greenwash," or exaggerate the extent of their environmentally friendly activities.

3. Challenges to Mobilizing Climate Finance

Significant challenges complicate efforts to scale up private climate finance in Asia-Pacific. There are several challenges to address. First, gaps in the climate information architecture hamper accurate assessment and tracking of risks, impeding both transparency and accountability essential for effective policymaking. Second, climate initiatives suffer from resource constraints, inadequate coordination, and lack of institutional oversight at the national level. Third, the global economy is weak, hit by successive shocks and the shift toward protectionist industrial policies and geoeconomic fragmentation, which threaten to imperil collective and cooperative action on climate change.

A. Gaps in the Climate Finance Architecture: Data, Disclosure, and Taxonomies

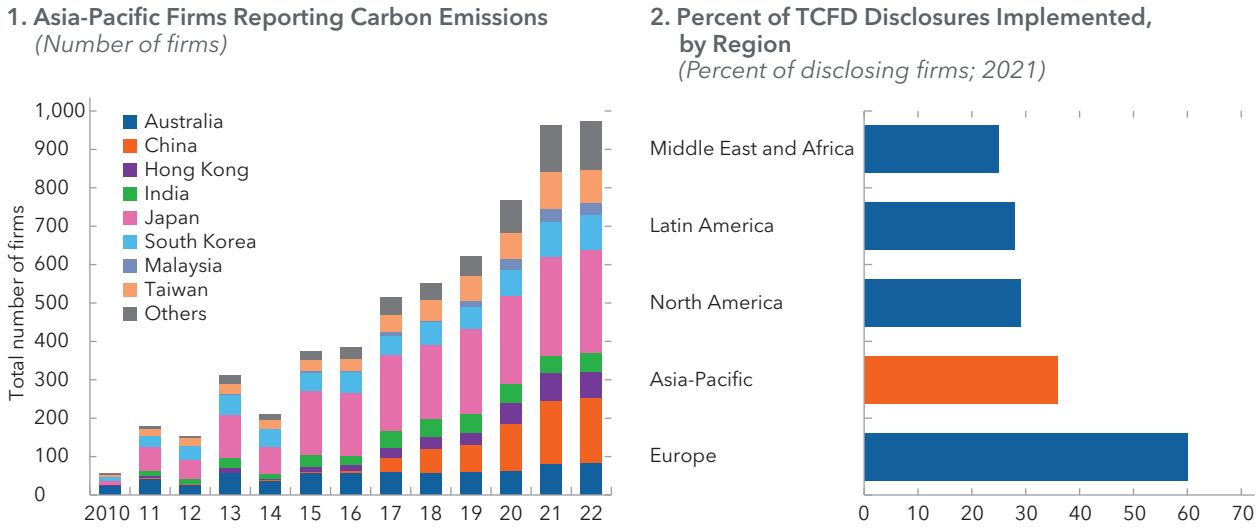
A sound climate information architecture is key to improving market confidence, safeguarding financial stability, and fostering sustainable finance. Decisive and globally coordinated efforts are needed to move forward on the three key pillars of a climate information architecture: (1) high-quality, reliable, and comparable data; (2) a globally harmonized and consistent set of climate disclosure standards; and (3) globally agreed-on principles for climate finance taxonomies and other classification approaches to align investments with climate goals.

Macro-critical data gaps and deficiencies limit the ability of governments, financial regulators and supervisors, and businesses to prepare for and respond to climate change. The inability to estimate geolocational climate conditions on a forward-looking basis hampers the assessment of country-specific economic risks, especially in areas prone to extreme weather events, which are central to disaster planning and risk management for the financial industry. Socioeconomic data gaps, including population vulnerabilities and adaptive capacities, create challenges in assessing the economic implications of climate change on labor markets and poverty. A lack of granular data on soil moisture, land use, interactions between ocean temperatures and currents, and sea level rise impedes assessments of agricultural productivity, food security, and affected sectors like fisheries and maritime transportation. Similarly, the lack of transition risk assessments makes it difficult to gauge the potential economic and financial stability impact of evolving toward a low carbon economy. In addition to data availability issues, there are also important data quality deficiencies regarding reliability (that is, consistency and transparency) and comparability (that is, lack of sound methodologies and metrics).[14] Furthermore, financing allocated to climate projects through conventional financing sources without proper screening supported by taxonomies and principles could be susceptible to greenwashing concerns.

These data gaps impede decision making and prevent the scaling up of climate finance. Investors need accurate and comparable data to assess risks and identify investable green and transition projects. Although private data closes certain gaps, significant room remains for improvement with official public data collected by statistical organizations and regulatory bodies such as central banks. Directing financial resources toward investment in climate mitigation and adaptation requires developing (1) metrics for decision making; (2) a climate taxonomy that provides criteria across the majority of sectors and activities to qualify them as "low carbon," "transitional," or "enabling"; and (3) harmonized disclosure standards (NGFS 2022; IMF 2021c).

[14] Network for Greening the Financial System (2022) discusses data availability, reliability, and comparability issues in detail.

Figure 8. Asia Seeing a Rapid Increase in Climate Disclosures and Is Ahead of Most Regions



Sources: Capelle and others 2023 based on data from ICE Data Services; and Financial Stability Board Task Force on Climate-related Financial Disclosures.
Note: Panel 1 plots the number of firms in the ICE Data Services data set headquartered in Asia-Pacific economies. "Other" includes Cambodia, Indonesia, Macao, Mongolia, New Zealand, Philippines, Singapore, and Thailand. The rest of the Asia-Pacific countries have no firms in the ICE Data Services data set. TCFD = Taskforce on Climate-Related Financial Disclosure.

Survey responses confirm that data gaps are the overarching constraint preventing central banks and financial authorities from imposing wider disclosure requirements (Annex Figure 1.1). Notably, 89 percent of respondents cite data gaps and a lack of capacity in firms to analyze available information for risk identification and reporting as the main challenges. A few respondents (for example, Hong Kong SAR and Thailand) are planning to build data repositories for environment-related operations, sustainable finance–related analysis and research, and risk management. Hong Kong SAR is developing data on historical catastrophic damages, as well as tools to estimate GHG emissions, with clearly disclosed methodologies that companies can use, while Korea is working to link relevant data systems by establishing a common platform for climate disclosures.

Taking a step in the right direction, more Asian firms are reporting their carbon emissions, and the region is ahead of most in this regard. Climate disclosure requirements exist in laws or regulations for private firms in several economies (Australia, Korea, Hong Kong SAR, Japan, Malaysia, Philippines, Thailand). Capelle and others (2023) document that the number of firms headquartered in Asia-Pacific that self-report their carbon emissions has risen from about 200 in 2014 to almost 1,000 in 2022 (Figure 8, panel 1). However, disclosure requirements are rarely imposed on government agencies and public institutions. Among recent cases, the Brunei Climate Change Secretariat launched the Mandatory Directive, which makes mandatory monthly and annual reporting of carbon inventory, directing all facilities that emit or remove GHGs to report their emissions to the government as of April 2023. Out of all survey respondents, only Korea mandates disclosures from its state-owned enterprises (Annex Figures 1.2 and 1.3).

There is a need to build on recent progress toward more comprehensive and transparent climate disclosures. The coverage of disclosure requirements varies significantly across regions (Figure 8, panel 2) and is often limited to a few sectors (Annex Figure 1.3).[15] Although the share of Asia-Pacific firms making climate disclosures has grown, significant room remains for progress. Asia-Pacific supervisors have made

[15] Asia-Pacific is the region with the largest number of firms supporting the Financial Stability Board Task Force on Climate-Related Financial Disclosures (TCFD), but there is significant variation across countries (that is, half of the supporters in the region are from Japan). Across all regions, a significant portion of the TCFD support arises from the financial sector. Also, the coverage of TCFD recommendations vary significantly across regions.

improvements in adopting climate disclosure recommendations by the Taskforce on Climate-Related Financial Disclosures (TCFD) in recent years. Both Hong Kong SAR and Malaysia[16] will mandate disclosures aligned with TCFD recommendations for listed companies, while New Zealand will require large firms, including financial sector entities, to report climate disclosures starting in 2023. Central banks in China, Japan, and Singapore have also issued guidelines in line with TCFD recommendations (Shirai 2023). However, the adoption of recommendations concerning governance, strategy, risk management metrics, and targets is lagging in Asia-Pacific compared to Europe.[17] Moving ahead, it is crucial that climate-related disclosures align with the globally harmonized sustainability disclosure standards set by the International Sustainability Standards Board (ISSB). Companies applying the new International Financial Reporting Standards S1 (general sustainability) and International Financial Reporting Standards S2 (climate-related)—effective for annual reporting beginning in January 2024—will meet the TCFD recommendations that are fully incorporated into ISSB standards.[18]

Although most Asian economies lack a functional climate taxonomy, the trend is becoming more common. A total of 7 of 12 countries surveyed reported having no climate taxonomy that defines economic activities and financial instruments that qualify as "sustainable" (Annex Figure 1.2). The People's Bank of China issued the region's first climate taxonomy in 2015, which has been supplemented by additional guidelines. Korea, Indonesia, Malaysia, and Mongolia have finalized their taxonomies, while several other economies in the region are at various stages of development. In Japan, high-level guidance on climate finance is made available by the government and the development of a taxonomy is under consideration.[19]

To achieve regional scale, taxonomies will need to become interoperable and comparable. China has worked to highlight major areas of commonality between the EU and Chinese taxonomies, as a crucial step toward increasing comparability and interoperability (see IPSF 2022), including through the European Commission International Platform on Sustainable Finance. The ASEAN economies are at the forefront of efforts to achieve regional harmonization, with development of version 2.0 of the regional taxonomy (ASEAN 2023a, 2023b). The regional taxonomy provides alignment on underlying principles and helps to harmonize the classification of sustainable activities and assets across ASEAN, with screening criteria for six focus sectors and three enabling sectors, including carbon capture, storage, and utilization and certain coal phaseout activities. The different criteria of alignment (red/amber/green) aim to support financing initiatives such as Asian Development Bank's Energy Transition Mechanism, Indonesia's Just Energy Transition Partnership, and the Managed Phaseout Program (Gardes-Landolfini and others 2023b).[20]

Lack of accurate climate labels and climate impact scores also limits sustainable investments going into EMDE Asia.[21] In the absence of climate labels and impact-oriented scores, fund managers and investors use ESG scores to gauge the impact of climate policies, but as noted earlier, ESG scores are problematic as a climate metric. Low scores may unfairly penalize EMDE Asia as ESG funds allocate only a small share of their portfolio to EMDE assets, and this allocation is mostly concentrated in major emerging market economies such as China.

[16] With interim implementation deadlines prior to the end of 2024.

[17] See TCFD (2022, Figure A6) for a comparison of disclosures at a regional level.

[18] International Sustainability Standards Board (ISSB) standards in certain cases provide some additional requirements and guidance, which are broadly in line with the TCFD recommendations. International Financial Reporting Standards (2023) provides a detailed comparison.

[19] See also Gardes-Landolfini and others (2023a, Appendix B and Table B.1).

[20] In the context of developing the Singapore Taxonomy 2023, the Monetary Authority of Singapore held a consultation on the criteria for coal phaseout.

[21] See NGFS (2022) for more information.

B. Challenges Stemming from National Policies

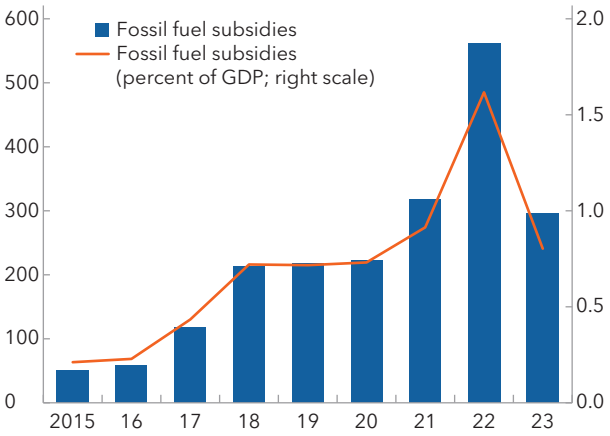
Inadequate institutional coordination and cohesion presents a challenge to building capacity that is needed to facilitate climate finance. Climate change adaptation, mitigation, and transition plans require a related human resources strategy to ensure quality work, adequate capacity, and skills, equipped with a plan for retaining, retraining, and reskilling. Most survey respondents flagged the lack of capacity and expertise to "monitor, report, and verify" climate-related risks and impact of climate policies, noting the need for capacity development support from multilateral institutions (Annex Figure 1.10). "Monitor, report, and verify" is crucial for building trust and accountability in Asia's climate agreements, as they provide a level of assurance to investors about the reliability of climate actions and their outcomes. However, without a clear and coherent institutional framework, it becomes harder for governments to identify priority areas, reduce duplication, and share best practices, innovations, and lessons learned, all of which are essential for effective capacity building. In this regard, respondents preferred peer-learning opportunities to address capacity gaps in implementing taxonomy and disclosure standards (Annex Figure 1.6). By providing structure, clarity, and direction, a strong institutional framework ensures that capacity at the institutional and individual levels is developed endogenously and can eventually be maintained and enhanced independently from international support (UN Climate Change 2023).

Nevertheless, gaps persist in the national institutional frameworks supporting Asia's Nationally Determined Contributions and National Adaptation Plans. The institutional framework for climate finance—including climate strategies, risk assessments, and implementation plans—varies across countries and is often not comprehensive. For instance, Indonesia's climate finance strategy covers only the public sector, while Malaysia's covers only the private sector (Annex Table 1.1). Responsibilities for climate policy tend to be spread across many government ministries, and coordination is often a challenge, especially in Asia-Pacific countries that do not have an oversight committee (Annex Figure 1.4). Further compounding these challenges are long-standing structural issues related to the regulatory and legal complexity of doing business—including contract enforcement, property rights, and management of fiscal risks and public investment—that make it hard to attract long-term investments in sustainable infrastructure. Many Pacific island countries find it difficult to meet the stringent accreditation requirements of the Green Climate Fund as their capacity is already stretched thin and public investment management is challenging (Fouad and others 2021b). Finally, shallow financial markets across much of EMDE Asia constrain the ability of investors to hedge against long-term risks.

The ongoing subsidization of fossil fuels reduces the viability of green projects and impedes the transition to renewable energy. In much of the region, policies such as administered prices and direct subsidies lower the cost of fossil fuels below international prices. In 2022, fossil fuel subsidies in Asia-Pacific surged to $579.7 billion, or about 44 percent of the global total (Black and others 2023), as governments supported consumers and businesses during the global spike in energy prices caused by Russia's invasion of Ukraine and the economic recovery from the pandemic (Figure 9).[22] Subsidies to consumers of natural gas and electricity account for the bulk of fossil fuel subsidies in the region. These policies inadvertently promote a carbon-intensive economy. By tilting the playing field in favor of fossil fuels, they make investments in alternative energy sources less competitive and consume fiscal resources that could be strategically directed toward accelerating the energy transition.

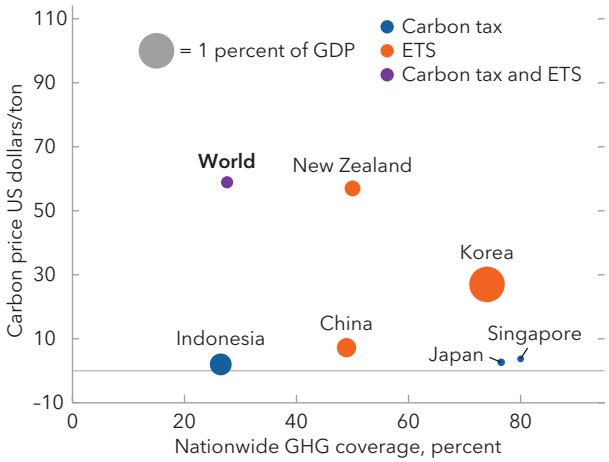
[22] Black and others (2023) also produce estimates of implicit fossil fuel subsidies, which correspond to undercharging for the environmental costs of climate change and air pollution, as well as forgone consumption taxes. When these implicit subsidies are included, Asia-Pacific reached more than $3 trillion in 2022, making up nearly two-thirds of the global total.

Figure 9. Fossil Fuel Subsidies in Asia-Pacific
(Billions of US dollars)



Sources: Black and others (2023); and IMF, Fiscal Affairs Department.

Figure 10. Asia-Pacific: Carbon Pricing
(Bubble size shows value of pricing initiative)



Source: Parry, Black, and Zhunussova (2022).
Note: The figure shows only countries that have implemented carbon pricing schemes. Bubbles denote government revenues in percent of GDP and linked to the respective carbon pricing initiative for the country. ETS = emissions trading system; GHG = greenhouse gas.

The recent momentum toward the introduction of carbon pricing in the region is a positive development. Five countries in Asia (China, Indonesia, Japan, Korea, New Zealand) have introduced emission trading schemes, while only Japan and Singapore have implemented a carbon tax (Figure 10).[23] As the survey confirms, policymakers in the region favor introducing an emissions trading system to imposing a direct carbon tax, although the latter offers significant practical advantages as it covers broader emissions sources and helps promote administrative simplicity, predictability of emissions prices, revenue generation (since there Yis less pressure to grant free allowances as under the ETS), and complementarity with overlapping policies (Parry, Black, and Zhunussova 2022). So far, the implementation of carbon pricing has been slow and patchy, with coverage generally narrow and restricted to a few sectors (Table 1).

Eliminating fossil fuel subsidies and making carbon pricing more extensive would lead to major fiscal savings in Asia-Pacific, but governments are reluctant to take this step. High debt levels, rising debt distress situations, and low fiscal revenue across Asia-Pacific limit the fiscal resources that can be dedicated for climate action (Figure 11), a concern cited by survey respondents as a critical challenge for mobilizing climate action (see Annex Table 1.2). According to IMF estimates, removing subsidies with a full fossil fuel price reform could raise additional fiscal revenue by about $1.8 trillion or 4.4 percent of GDP in East Asia and the Pacific (Black and others 2023). In addition, introducing comprehensive carbon pricing can reduce emissions and raise revenues (Table 1). Mobilizing these additional revenues would help address EMDE Asia's climate financing gap. Nevertheless, public opposition, stemming from concerns about inflation, loss of competitiveness, and income inequality, has made governments less keen to take wholesale action. To navigate political sensitivities and garner support for climate goals, the challenge remains for governments to communicate effectively and build public awareness around the relative costs of inaction versus the benefits of climate policy options.

[23] Japan introduced a carbon tax of about $3 per ton in 2012. In Singapore, the carbon tax was introduced in 2019 starting at S$5 per metric ton and will rise to S$25 per metric ton in 2024 and to between S$50 and S$80 by 2030. The tax applies to all facilities that directly emit at least 25,000 tons of carbon dioxide equivalent of GHG emissions annually, which make up about 80 percent of total emissions. In 2021, Indonesia legislated plans for the introduction of a carbon tax in 2022, but its implementation has been delayed. However, Indonesia launched an emissions credit trading system in 2023.

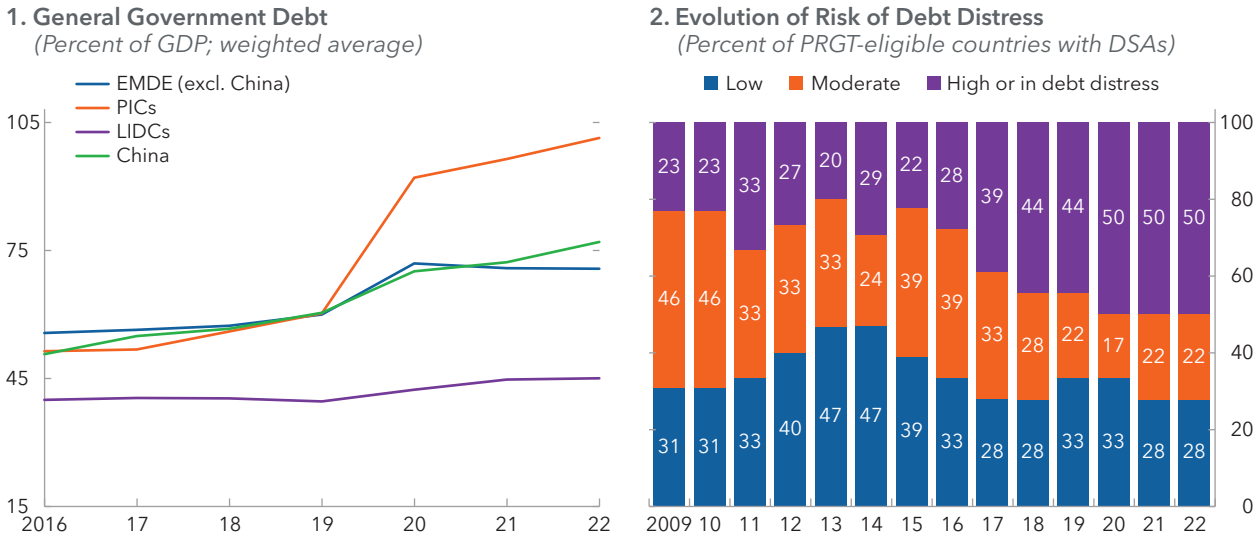
Table 1. Details of Carbon Pricing Schemes in Asia-Pacific Region, 2021

Country/ Region	Year Introduced	Coverage of Energy Sectors				Coverage Rate, all GHGs (percent)	Price, $/ton	Revenue/ Rent, percent of GDP	Point of Tax/ Regulation	Revenue Use
		Power	Industry	Transport	Buildings					
Carbon Taxes										
Indonesia	2022	✓				26	2	0.05	Midstream	General budget
Singapore	2019	✓	✓			80	4	0.04	Midstream	General budget
ETSs										
China	2013, 2014, 2016, 2021	✓				38	9	0.32	Downstream	Environmental spending proposal
Korea	2015	✓	✓	✓	✓	73	19	0.99	Downstream	Environmental spending
New Zealand	2008	✓	✓	✓		49	53	0.20	Downstream	General budget, environmental spending
Hybrid										
Japan	2010, 2011, 2012	✓	✓	✓	✓	77	2	0.05	Midstream	Environmental spending

Sources: Fraser Institute; government sources; Organisation for Economic Co-operation and Development; and World Bank, Carbon Pricing Dashboard.

Note: Revenue/rent excludes revenue loss from erosion of prior fuel tax bases. The table shows only countries that have implemented carbon pricing schemes. ETSs = emissions trading systems; GHGs = greenhouse gases.

Figure 11. Asia-Pacific: Limited Fiscal Space

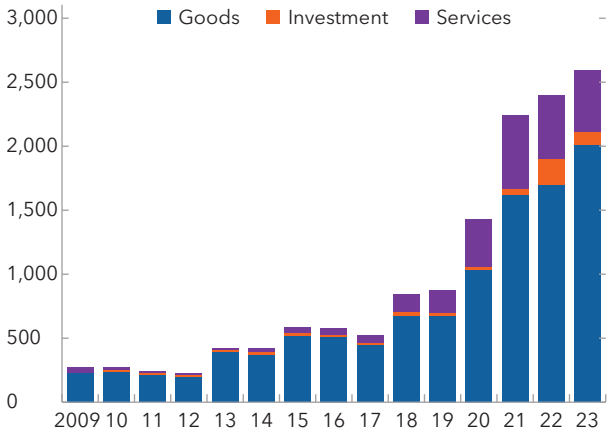


Sources: IMF, Low-Income Country DSA database; IMF, World Economic Outlook database; and IMF staff calculations.
Note: DSA = Debt Sustainability Analysis; EMDE = emerging market and developing economies; LIDCs = low-income developing countries; PICs = Pacific island countries; PRGT = Poverty Reduction and Growth Facility.

C. Challenges Stemming from Global Issues

The recent trend toward geoeconomic fragmentation of trade and financial flows could complicate climate action (IMF 2022b, 2023a). Energy prices have been highly volatile over the past two years as demand frequently outstripped supply amid the recovery from the global pandemic. This has ushered in a renewed focus on energy security, a concern that has been exacerbated by geopolitical tensions stemming from Russia's invasion of Ukraine and from "strategic de-risking" in the fields of trade and technology between China and the United States (Georgieva 2023). Supply chains are being splintered into politically aligned blocs, as countries turn to "friend-shoring"—aligning with trusted allies to ensure access to affordable and reliable energy. Adding to this complexity, new export restrictions are increasingly being placed on trade in commodities that are vital for the low carbon transition, such as nickel and germanium (Figure 12). In 2022, the number of new trade restrictions affecting commodities rose to six times its 2016–19 average (IMF 2023c). The shift to protectionist policies risks retaliation from trading partners and threatens to make the production of solar panels and electric vehicles more costly. If economic global fragmentation continues to deepen, it could delay the implementation of transition policies, including the retirement of nuclear and coal-fired power plants,[24] and impede technology transfer and peer collaboration that are needed to promote capacity building and learning opportunities for EMDEs.

Figure 12. Harmful Trade Restrictions Imposed
(Number)



Source: Global Trade Alert (2023).

[24] It raises questions about both plausible decarbonization paths and the design of short- and long-term decarbonization scenarios (Gardes-Landolfini and others 2023b).

At the regional level, ASEAN governments are increasing their collaboration to support their member states' energy security and competitiveness throughout the transition.[25] Lock-in risks are particularly important in Asia, given the ongoing development of coal-fired power production and the relatively young age of coal-fired power plants in the region (IEA 2022a).[26] On the international front, coordination in the introduction of carbon pricing has stalled. Although revenues from carbon taxes and emissions trading systems have recently increased,[27] there remains no effective global policy coordination regime for mitigation efforts. Unilaterally raising carbon prices above the levels of trading partners leads to carbon leakage (with carbon-intensive production moving to trading partners) and thereby offset reduced domestic emission.[28] Large disparities in carbon pricing across countries also raises concerns about competitiveness, which have prompted some countries to consider carbon border adjustment tax (taxing embodied carbon in imports and rebating for embodied carbon in exports) as an interim response to ensure a level playing field. These measures, in turn, risk further escalating trade tensions and are complex to administer and prone to legal challenges and are also less effective in scaling up global mitigation efforts as emissions in traded products only account for 10 percent of total emission (Parry and others 2021).

[25] See Joint Statement of ASEAN Ministers of Energy, issued August 2023.

[26] See also Gardes-Landolfini and others (2023b) on coal phaseout.

[27] World Bank, 2023, "State and Trends of Carbon Pricing 2023," Washington, DC, May 23, https://www.worldbank.org/en/news/press-release/2023/05/23/record-high-revenues-from-global-carbon-pricing-near-100-billion.

[28] Empirical evidence on leakage rates at the national level is mixed, although they tend to be larger for small open economies (Keen, Parry, and Roaf 2021).

4. Policy Considerations and the Way Forward

A. The Role of Governments

Governments must integrate mitigation and adaptation targets into a climate finance strategy and establish a sound climate governance framework for attracting private capital. A key step is to create a climate finance strategy that articulates how Nationally Determined Contributions and National Adaptation Plans are translated into policies and financed. The strategy should not only state broad ambitions but also lay out deliverables and timelines, financial estimates, and key stakeholders involved. In this regard, developing a nexus between countries' climate plans and alignment approaches, such as taxonomies, is important. Establishing a centralized body or authority specifically responsible for the coordination of all climate-related activities will limit silos. The coordinating authority would facilitate information sharing across the public sector, avoiding duplication of efforts and ensuring the efficient use of resources. It should also periodically undertake assessments of investment needs, determine priority projects, and identify gaps and bottlenecks that are impeding the green transition. Regular progress reports should be made available to the public. By developing concrete action plans with transparency and accountability, governments would foster an enabling environment for private sector investors.

In Asia-Pacific, there is a need to mobilize additional domestic fiscal resources for climate initiatives. This action can be achieved through subsidy reforms and introducing carbon pricing schemes. Phasing out fossil fuel subsidies is often difficult politically, but subsidies in Asia are highly regressive, disproportionally benefiting higher-income households who are the least in need. Carbon taxation can directly mobilize revenues—and would be a rational response to a border carbon adjustment tax as revenues would be retained for domestic use—and engender a behavioral response in favor of greener production and consumption choices. Revenues generated from schemes such as allowance auctioning under an emissions trading system could be redirected to investments that support the green transition, as well as redistributed to low-income and vulnerable households. Alonso and others (2021) argue that vulnerable households who would stand to lose from subsidy reform can largely be identified by Asia-Pacific governments and should be supported by the introduction of targeted support schemes. Dabla-Norris and others (2023a, 2023b) find that carbon pricing can receive stronger public support if it is perceived to be effective in reducing emissions, the cost burden is fairly distributed, and the revenues are used to increase social spending on health care and education.

To attract private capital—preferably in the form of equity investments—governments should aim to appropriately align risk-return trade-offs of climate-related investment projects. Asia-Pacific has depended heavily on coal-fired power plants as they generate affordable and secure energy needed for economic development. Although investment costs of renewables (for example, solar photovoltaic and onshore wind) have fallen over the past decade, transitioning to net zero emissions is still costly when we consider needs for infrastructure investments in grid networks and storage facilities. Appropriate policies and innovative financing structures may be needed to support coal phaseouts, with due consideration of country circumstances (IMF 2023b).[29] Public-private partnerships offer a useful avenue to leverage private sector expertise and finance (Annex Figure 1.7). Provision of credit guarantees in public-private partnerships is a credit enhancement mechanism and offers incentives for private counterparts to make investment. The use of guarantees in blended finance also offers incentives by aligning risk-return trade-offs to attractive levels. Governments

[29] World Bank, 2023, "Scaling Up to Phase Down: Financing Energy Transitions in the Power Sector," Washington, DC, April 20, https://www.worldbank.org/en/news/press-release/2023/04/20/scaling-up-to-phase-down-financing-energy-transition-in-developing-countries.

can also consider targeted subsidies to promote green transition, consistent with World Trade Organization rules, which could steer businesses and consumers to adopt low-carbon and green technologies while also lowering their costs of adoption (Kammer 2023). These financing approaches leverage private capital for long-term investments, and governments need to assume an appropriate allocation of contractual risks with private parties (Fouad and others 2021a). Strengthening infrastructure governance is indispensable in this regard for the timely delivery of projects, preventing cost overruns, and managing project and fiscal risks.

Governments should establish a strong climate information architecture, harnessed by high-quality data. By definition, a climate information architecture comprises the three pillars of climate finance taxonomies, climate disclosure standards, and climate-related statistics. It is an important policy mix, designed to facilitate more accurate market pricing of risks, enable more informed investment decisions, and foster the growth of climate finance (Prasad and others 2022). Governments must establish a strong climate information architecture, requiring:

- *Climate finance taxonomies that follow globally agreed principles* as they determine whether investments in particular activities are aligned with climate goals. Governments must be mindful that varying stages of economic development lead to different pathways to net zero since different countries have varying starting points, capacities, and resource endowments (IEA 2023). However, applying the principles and harmonizing the taxonomies can attract cross-border climate finance flows and leverage regional economies of scale. In addition, transition taxonomies can help navigate the economy by identifying activities that may reduce GHG emissions over time (IMF 2023b).

- *A globally harmonized and consistent set of climate disclosure standards* will facilitate the pricing of climate finance instruments and the analysis that is required to assess climate risks for market transparency and integrity, which all lend support to attracting climate-related financial support. Climate disclosures can be mandated initially for targeted industries or firms exposed to large transition risks.

- *Timely, reliable, granular, and comparable data* that promotes sound decisions of climate-related investment and finance. Governments must provide adequate resources to their statistical agencies to collect data and develop macro-critical aggregates. National statistical agencies have an important role to align taxonomies at the business level with international statistical classifications and standards.

Public investment management reform can facilitate investment toward mitigation and adaptation goals. Inefficiencies in public investment processes lead to about 30 percent lower potential gains from public investment (IMF 2015). Scaling up of public investment—while minimizing losses—therefore requires efforts to strengthen public investment management. Its reforms should be based on public investment management assessment (PIMA), a comprehensive framework to assess infrastructure governance practices. PIMA evaluates three key stages of the public investment cycle and identifies inefficiencies in the public investment processes, involving planning of investment projects, resource allocation, and implementation of the projects for timely delivery. PIMA also evaluates qualitatively the legal and regulatory framework, staff capacity, and information technology systems. Public financial management (PFM) reforms can help governments identify bankable and deliverable projects based on their national climate strategies. The reforms would enable governments to establish numerical targets to adopt green technologies to achieve mitigation goals and estimate associated financing needs. Strengthening the capacity to assess the costs and risks of climate-related debt should be incorporated in the estimation of climate investment needs. Likewise, assessment of infrastructure resilience and its adequacy becomes possible, which allows governments to address adaptation gaps (Aligishiev, Bellon, and Massetti 2022). More generally, the public investment management reforms should strengthen institutional capacity to better manage public investment processes, generate economic dividends from public investment, and attract private capital for financing.

Strengthening economic management is fundamental to attracting private capital. Sovereign and foreign exchange risks are among the most critical factors for investment decisions in EMDEs since they add to the calculation of risk-return trade-offs. Inappropriately loose fiscal or monetary policies can raise public debt and lead to external vulnerabilities, raising sovereign and foreign exchange–related risk premiums. Cost of funding increases as a result, making it expensive to attract private capital for mitigation and adaptation projects. Governments should maintain sound macroeconomic policies to lower risk premiums. Mainstreaming adaptation strategies in fiscal policy can also strengthen economic resilience to climate change, reducing macro-fiscal risks while generating long-term savings of domestic resources (Aligishiev, Bellon, and Massetti 2022).

B. The Role of Central Banks and Financial Sector Supervisors

Central banks and financial sector supervisors increasingly recognize financial stability risks associated with climate change. Physical risks such as more frequent and severe natural hazards and risks of stranded assets in the transition to a low carbon economy must be effectively integrated into the prudential frameworks (IMF 2022c). To help accurately measure risks and encourage investment in climate projects, they should develop supervisory guidelines on how to incorporate reporting climate risks, strengthen the supervisory reporting requirements of climate-related data by financial institutions and climate-related financial disclosures, and strengthen capacity to conduct climate risk analyses. The in-house survey shows that Asia-Pacific central banks and supervisory agencies consider climate change a core responsibility and are actively taking necessary steps to promote climate finance (Annex Figures 1.8 and 1.9).

Central banks' role in incorporating climate change into monetary policy, central bank operations, and thereby developing green markets is governed by their legal mandate, principle of risk neutrality, and area of expertise. For instance, the European Central Bank—within its mandate—took steps last year to incorporate climate change into its central bank operations, including through adjustments in its corporate bond portfolio holdings and collateral framework. Where permissible within their mandate, incorporating climate considerations into collateral frameworks and asset purchases could foster green market development.[30] However, premature adjustments to the eligibility, such as preferential collateral requirement criteria when sustainable finance markets are underdeveloped or uncertainty about these markets during stress episodes, could pose considerable risks to financial stability. In fact, using prudential regulation as a substitute for effective government policy on climate is likely to be ineffective and generate unintended consequences. As the prudential framework is aimed at mitigating financial risks, green supporting factors should reflect a negative correlation between financial risks and "greenness" of exposures. In central banks where climate change is not part of the monetary policy mandate and sustainable finance markets are still underdeveloped, supervisors should still make progress in understanding the impact of risks stemming from climate change on financial stability through strengthening the climate information architecture and risk monitoring as well as through adjusting the prudential frameworks to incorporate the identified risks accordingly.

Supervisors should establish guidelines and requirements to report granular climate-related supervisory data beyond public disclosure requirements. Guidance to financial institutions could be issued along with requirements for supervisory reporting of granular data on climate exposures that will help with climate risk monitoring (for example, stress testing) and eventually inform regulatory policy development. For instance, supervisors should set expectations and guidelines on collecting data on credit exposures related to direct GHG emissions of counterparties (scope 1) as well as indirect exposures (scopes 2 and 3—for instance, spillovers and risk transfers through off-balance-sheet exposures) based on international best practices. Moreover, identifying sufficiently granular data on sectoral and geographic distributions of financial institutions' exposures to climate risks is instrumental for climate risk monitoring. Supervisors need to also require

[30] The Monetary Authority of Singapore adopted emission targets on its investment portfolio mostly arising from foreign reserves based on the carbon intensity of its equities and corporate bond portfolio (Shirai 2023).

greater consistency in the information submitted by financial institutions for comparability and aggregation across the financial system. As the availability, quality of information, and measurement methodologies improve, supervisors should move toward regular supervisory reporting requirements. These efforts will help ensure fair, efficient, and transparent markets with appropriate safeguards that will foster investor protection and promote climate finance.

To reduce the risk of greenwashing and improve the pricing of financial risks, supervisors should require public disclosures based on globally harmonized and consistent sustainability disclosure standards. As preceding sections of this paper discussed, some countries in Asia have already started adopting TCFD recommendations, while others have low implementation rates. To address inconsistent disclosure standards in the region, regulators in Asia-Pacific could issue guidelines on disclosure requirements, including implementation timelines and transition plans.[31] For instance, the IMF Financial Sector Assessment Program recommendations for the Philippines call for issuing more granular guidance on disclosing climate-related information (IMF 2021b). These guidelines should be in line with the ISSB reporting standards,[32] which recommend that financial institutions disclose both direct and indirect GHG emissions generated during the reporting period,[33] as well as their climate-related physical and transition risk exposures and the potential impact of these risks to their financial statements. The ongoing work of the ASEAN Capital Markets Forum to evaluate the feasibility of adopting ISSB standards based on their jurisdictions' legal and regulatory frameworks is welcome.

Strengthening the capacity to conduct climate risk analyses is needed to properly assess physical risks and transition risks stemming from climate change.[34] Although efforts to improve granular, comparable, and reliable data for climate stress tests are ongoing in the region, financial regulators could continue to accelerate their work to examine the potential impact of climate physical and transition risks with available data, scenarios, and risk analyses. In the interim, financial regulators could equip themselves with a suite of in-house models at macro, micro, and sectoral levels to gauge the impact at a systemic level (IMF 2022d). Based on a Network for Greening the Financial System–Financial Stability Board survey (FSB 2022a), several financial regulators in Asia-Pacific have performed scenario and risk analyses exercises that are aimed at raising awareness, and these could be used as best practices for other jurisdictions in the region. They include:

- Japan (Bank of Japan, Japan Financial Services Agency) and Hong Kong SAR requested financial institutions under their purview to factor climate-related counterparty risks with data obtained through counterparty engagements.
- The Monetary Authority of Singapore examined the macroeconomic implications of acute physical risk by simulating the effect of a severe flood, taking reference from damages associated with past flooding events in the Southeast Asia region and the impact of transition risk.
- The Bank of Korea used parameters such as carbon prices, sectoral emissions, and carbon sequestration to link the Network for Greening the Financial System (NGFS) transition pathways with an in-house microeconomic model to generate sectoral estimates under the NGFS scenarios.
- The Reserve Bank of New Zealand commenced physical and transition risk stress tests for the five largest banks to assess the impact of lengthy delay in enacting meaningful global climate policies.

[31] Although this section focuses on policies for greening the financial sector, it is important to note that strengthening disclosure requirements is an integral aspect for firms beyond the financial sector.

[32] For instance, the Monetary Authority of Singapore announced in 2022 its intention to set out a roadmap for mandatory climate-related disclosures in line with global baseline sustainability standards.

[33] Specific attention should be given to disclosing scope 3 emissions when material for the entity (indirect emissions associated with the reporting company's upstream and downstream activities in the reporting year). This is particularly important for financial institutions (that is, scope 3 – investments) where data gaps are significant.

[34] The IMF Climate Change Indicators Dashboard provides a set of cross-country comparable physical and transition risk indicators. Also, the new Data Gaps Initiatives aim to develop methodology for forward-looking physical and transition risk indicators (Box 3).

- The People's Bank of China's 2021 climate stress test exercises focused on the impact of an increase in GHG emission costs on the repayment capability of companies in carbon-intensive industries, and the subsequent impact on the asset quality and capital adequacy levels of banks (Shirai 2023).

Since model uncertainty and complexity, data quality issues, and long-time horizons associated with climate risks are additional challenges associated with climate risk analyses compared to conventional stress tests, a variety of models and scenarios could be considered by financial regulators. In this regard, IMF Financial Sector Assessment Program stress-testing exercises could be considered as one of the first steps in assessing climate risks.

Supervisors should incorporate climate-related financial risks into the prudential framework.[35] To the extent that climate change has consequences for the resilience of the banking system, legal frameworks in-line with international best practices provide the basis for implementing a range of regulatory and supervisory actions regarding climate change (BCBS 2022; NGFS 2020, 2021a, 2021b, 2022). Following international best practices, prudential supervisors in the region should clarify—through supervisory guidelines—what is expected of financial institutions regarding climate-related risks. Supervisors should also allocate adequate resources and build internal capacity for supervision of climate risks. In the absence of granular data and well-established methodologies for the quantification of climate risks, qualitative measures such as requiring financial institutions to strengthen their risk management and internal control systems, procedures, and processes, or the reduction of risk exposures would supplement this process (NGFS 2020). In addition to international best practices, financial regulators in Asia could benefit from best practices within the region. For instance, the Monetary Authority of Singapore issued guidelines on environmental risk management for banks, recommending banks (1) develop plans to manage significant concentrations in their portfolio to geographies and sectors with higher environmental risk and (2) regularly review capacity-building programs to incorporate emerging issues related to environmental risk management, among others (MAS 2020).[36]

At a more global level, progress is needed on developing climate labels for sustainable investment funds and creating climate impact–oriented ESG scores. To align investments to climate goals, as IMF (2023b) suggests, an alignment with GHG objectives is needed. However, the use of sustainability labels is still at its infancy, and therefore, within their mandate, regulators and supervisors should set clear guidelines and enforcement procedures. Shifting the focus of ESG scores to better capture sustainability and climate impact—perhaps through an alternative metric—would require cooperation at a technical level between regulators and supervisors globally. Coordination through multilateral standard setters such as the International Organization of Securities Commissions[37] could be useful to develop staff-level expert analyses and policy recommendations to align ESG scores to climate outcomes, enabling reliable insights and comparisons across firms.

[35] However, jurisdictions with weak regulatory and supervisory framework should first focus on the fundamentals. Incorporating climate-related risks in a weak prudential framework is likely to be ineffective and might distract the authorities from more urgent matters.

[36] Separate guidelines for other subsectors in the financial sector are also available (insurers, asset managers). The introduction of guidelines was followed by thematic reviews to identify emerging and good practices among financial institutions as well as areas for further work.

[37] Australia (Australian Securities and Investments Commission), Bangladesh (Bangladesh Securities and Exchange Commission), China (China Securities Regulatory Commission), Hong Kong SAR (Securities and Futures Commission), India (Securities and Exchange Board of India), Japan (Financial Services Agency), Korea (Financial Services Commission/Financial Supervisory Service), Malaysia (Securities Commission), and Singapore (Monetary Authority of Singapore) are International Organization of Securities Commissions members.

C. The Role of the IMF and Other Multilateral Institutions

By covering climate-related policies and risks in surveillance activities, the IMF provides informed advice on the climate commitments made by member countries. The IMF's bilateral engagement helps it identify capacity development needs, including in the areas of climate PFM, public investment management, debt management and sustainability, and frameworks for public-private partnerships. For example, the IMF's climate PIMA can help address uneven institutional capacity, fragmented oversight, and weak institutional coordination.

The IMF also has an important role to play in filling financing gaps. The IMF has recently introduced a new climate facility to its lending toolkit, the Resilience and Sustainability Trust (RST). The RST offers long-term, affordable financing to countries undertaking reforms that reduce their vulnerability to prospective balance of payments shocks, including those related to climate change. By anchoring a coherent policy framework, the instrument can help mobilize concessional financing from other sources, including the private sector. Bangladesh is the first Asia-Pacific member to benefit from the RST, which has received strong demand from around the world.[38]

Although the resources available through the IMF's RST are insufficient to meet the large climate financing needs for mitigation and adaptation, it can help catalyze financing from other sources. Reducing macro risk premiums, particularly from exchange rate risks, is paramount to a successful mobilization of private capital to EMDEs. RST-supported programs can contribute by helping countries restore sound macroeconomic management and build the institutional capacity of the public sector for de-risking private investment. For example, RST programs[39] can support the design of a coherent climate policy package that enhances climate-related risks management for financial institutions, strengthen climate-related public financial and investment management, and improve capacity to assess the macroeconomic impacts of climate change.

The IMF can support its membership to develop institutional capacity to mainstream climate into macroeconomic frameworks. Survey respondents overwhelmingly select "capacity development" as the main form of support from the IMF and other multilaterals (Annex Figure 1.10). Areas of capacity development needs depend on each country's context but broadly cover the financial and the fiscal sectors, and statistics, among other priority sectors. Collectively, they aim to enhance macroeconomic management under climate change.

- *Financial sector*: Capacity development should focus on safeguarding financial stability to climate change–related risks. To support central banks and financial authorities in their efforts to strengthen the climate finance architecture, the IMF has integrated assessments of the impact of climate change on financial stability risks in its Financial Sector Assessment Program, including for the Philippines in the region. This allows the IMF to raise awareness of the risks and adaptation needs to effectively address both physical and transition risks (Adrian and others 2022).

- *Fiscal sector*: Mainstreaming climate into fiscal policies is a cornerstone to promote a green transition and strengthen resilience to climate change. There are three key areas of enhancing capacity to integrate climate into fiscal policies. They include mitigation policy analysis, climate-focused PFM, and analysis of macro-fiscal impacts. In this regard, the IMF has developed tools, such as the Climate Policy Assessment Tool that offers tailored analysis of mitigation policy and integrated climate considerations into existing capacity development programs covering PFM and public investment management. The green PFM framework provides a holistic view of entry points and opportunities for integrating climate priorities into

[38] Since its implementation in early 2023, Resilience and Sustainability Trust (RST)–supported loans have also been approved for Barbados, Costa Rica, Jamaica, Kosovo, Niger, Rwanda, Senegal, and Seychelles. So far, about 40 members have expressed interest in the facility.

[39] Disbursements under the RST programs are not earmarked to address mitigation or adaptation goals.

PFM frameworks. Climate PIMA, a core element of the green PFM framework, assesses countries' capacity to manage climate-related infrastructure along five dimensions: planning, coordination, project appraisal and selection, budgeting and portfolio management, and risk management. Capacity development is also evolving to cover analysis of the macro-fiscal impacts of climate change and adaptation needs.

- *Statistics*: The IMF is updating its statistical manuals to better address environmental sustainability.[40] The System of Environmental Economic Accounting has been developed as the international statistical standard and provides the underlying framework of integrating energy and air emissions accounts in the national accounts. It is also providing capacity development to close climate change data gaps,[41] as well as disseminating climate data through the IMF Climate Change Indicators Dashboard (Box 3). The IMF, in close cooperation with the Financial Stability Board Secretariat and the Inter-Agency Group on Economic and Financial Statistics, and in consultation with participating economies, have developed a workplan for a new Group of Twenty Data Gaps Initiative that includes seven recommendations on climate change, one of which is on green debt and equity financing. The recommendation focuses on developing methodological guidance to improve data on issuance and holdings of green debt securities and listed shares by sector of issuer and holder for Group of Twenty economies. This work is expected to improve the climate information architecture by ensuring greater interoperability and comparability of climate finance statistics across the Group of Twenty economies.

Multilateral institutions must collaborate to facilitate peer-to-peer learning across countries. The IMF has been working with other multilateral institutions, such as the Bank for International Settlements, the NGFS, and the World Bank, among other multilateral institutions, to offer a platform for sharing knowledge, good practices, and solutions on common issues and challenges facing policymakers. For example, the IMF, in collaboration with the Basel Committee and the NGFS, has organized workshops on climate risks to help raise awareness of climate-related risks and facilitated experience sharing and built the capacity of member countries to incorporate these risks into their supervisory frameworks (IMF 2022e).[42]

Multilateral development banks (MDBs) could expand their lending capacity to help countries tackle climate change. MDBs can tap into their comparative advantages—specialized knowledge and expertise, preferred creditor status, and financial leverage—to develop specific programs and lending vehicles for climate projects. Risk-mitigating mechanisms—such as credit and performance guarantees—could help de-risk MDBs' loan exposures and free up room in their balance sheets for more lending. The Asian Development Bank's Innovative Finance Facility for Climate in Asia and the Pacific is an example of a donor-backed guarantee facility that will enable the Asian Development Bank to leverage its balance sheet by multiple times. Although risks should be properly managed, in a time of growing need and tightening fiscal budgets, de-risking mechanisms could help other MDBs expand their lending capacity and shift more resources to climate action.

As MDBs look to scale up their ambition on climate finance, achieving a balanced allocation between mitigation and adaptation lending would be important. Funding from the MDBs, in the form of grants or concessional terms for low- and middle-income countries, helps promote the viability of projects with high social benefits in these countries. But mitigation continues to capture the lion share of climate financing—in

[40] *Balance of Payments and International Investment Position Manual* will include an updatable annex on sustainable finance, and *System of National Accounts 2025 Update* will have additional environmental classes for bonds, loans and equity, and investment fund shares. The System of Environmental Economic Accounting will be revised to provide agreed definitions, classifications, and accounting rules for climate change–related statistics.

[41] In cooperation with the Swiss State Secretariat for Economic Affairs, the IMF initiated a two-year Environment and Climate Change Statistics Capacity Development Program to assist countries in developing timely and internationally comparable statistics to support the design and monitoring of policies to address the environmental, financial, economic, and social implications associated with climate change.

[42] The workshops provided an overview of the ongoing initiatives to develop international standards and guidelines on climate-related risks, emerging supervisory practices, and progress and challenges in integrating climate-related risks into prudential frameworks. Participants shared their experiences and approaches to supervision of climate-related risks, practices within their supervised entities, and challenges impacting on supervision of climate-related risks.

Box 3. The IMF's Global Initiatives to Improve Climate Data

The IMF currently leads two climate data–related initiatives to improve the climate information architecture. Both projects involve extensive collaboration with other international institutions (including the Bank for International Settlements, the European Central Bank, Eurostat, the Financial Stability Board, the Organisation for Economic Co-operation and Development, the UN Statistics Division, and the World Bank), as well as national statistical agencies.

The Climate Change Indicators Dashboard (https://climatedata.imf.org/) provides a set of globally comparable climate indicators to enable cross-country analysis. It includes select statistical and experimental indicators on climate change, greenhouse gas emissions from economic activity, trade in environmental goods, green finance, government policies, and physical and transition risks. The financial indicators track the resources allocated to supporting a transition to a low carbon economy. Namely, the Carbon Footprint of Bank Loans indicator aims to track carbon intensity of banking loans and the Green Debt indicators help assess the trends in climate finance to mitigate the economic and social cost of climate change through market-based means. The climate-related physical and transition risk indicators provide information on the impact of climate change on economic growth and financial stability. Although the indicators coverage varies across countries, the Dashboard includes data for all countries in Asia-Pacific.

The Group of Twenty Data Gaps Initiative (https://www.imf.org/en/News/Seminars/Conferences/g20-data-gaps-initiative) aims to bridge data gaps affecting the most urgent policy needs. The third phase of this initiative covers 14 recommendations addressing various priority policy areas. There are seven recommendations on climate change:

- Tracking progress toward national greenhouse gas emissions and national carbon footprints;
- Monitoring the energy mix used by economic activities, including the share of renewable energy sources;
- Monitoring cross-border emissions through trade, investment, and global value chains;
- Tracking the source of funds available for green projects that can mitigate climate change;
- Quantifying and monitoring forward-looking risk to help prioritize and develop support for climate action;
- Providing comparable estimates for insight into government subsidy regimes to tackle climate change; and
- Tracking level of expenditures to mitigate and adapt to the effects of climate change to ensure achievement of national commitments.

2021, total MDB climate finance to low- and middle-income countries amounted to $50.7 billion, of which only $17.6 billion was channeled to adaptation (Table 2). In Pacific island countries where access to the Green Climate Fund is the most important avenue in supporting their efforts to adapt to climate change, partnerships with MDBs could overcome the accreditation challenges that they face (Fouad and others

Table 2. Total MDB Climate Finance, 2021
(Billions of US dollars)
By MDB

	Low- and Middle-Income Economies			High-Income Economies		
	Adaptation	Mitigation	Total	Adaptation	Mitigation	Total
AfDB	1.5	0.9	2.4	-	-	-
ADB	1.3	3.4	4.8	0.0	-	0.0
AIIB	0.7	2.1	2.7	-	0.1	0.1
EBRD	0.3	4.4	4.8	-	1.6	1.6
EIB	0.4	3.0	3.4	1.2	26.9	28.1
IDBG	1.7	3.1	4.8	0.3	0.5	0.7
IsDB	0.3	0.4	0.7	-	-	-
WBG	11.4	16.5	28.0	0.1	0.4	0.5
Total	**17.6**	**33.1**	**50.7**	**1.6**	**29.5**	**31.1**

By Region (Low- and Middle-Income Economies Only)

	Total	Of which:	
		Mitigation	Adaptation
Central Asia	1.9	1.4	0.5
East Asia and the Pacific	6.0	3.7	2.3
Europe: European Union	1.2	1.1	0.1
Europe: Non-European Union	5.3	4.7	0.5
Latin America and the Caribbean	9.8	6.8	3.0
Middle East and North Africa	4.1	3.0	1.1
South Asia	8.2	5.1	3.0
Sub-Saharan Africa	12.8	5.9	6.8
Multiregional	1.5	1.3	0.2
Total	**50.7**	**33.1**	**17.6**

Source: AfDB and others 2021, Annex A.1.
Note: ADB = Asian Development Bank; AfDB = African Development Bank; AIIB = Asian Infrastructure Investment Bank; EBRD = European Bank for Reconstruction and Development; EIB = European Investment Bank; IDBG = Inter-American Development Bank Group; IsDB = Islamic Development Bank; MDB = multilateral development bank; WBG = World Bank Group.

2021b). Official development assistance also plays an important role for Pacific island countries.[43] Ensuring adequate investments in adaptation will lay the groundwork for vulnerable communities worldwide to thrive amid changing climates, fostering a sustainable future.

[43] For example, Australia supports climate change action through its development assistance program, guided by the Climate Change Action Strategy. In August 2023, Australia announced its plan to increase support for the Pacific island countries by directing at least half of all investments valued at more than $2 million toward climate-focused projects by June 2025, rising to 80 percent of investments by 2029. New Zealand also announced in 2021 an increased climate finance commitment of $1.3 billion for 2022–25, with the condition that at least 50 percent will support Pacific island countries and at least 50 percent will target adaptation.

Annex 1. Results of the IMF Climate Finance Survey

Annex Table 1.1. Climate Finance Strategy

Many countries have climate finance strategies, but they are not comprehensive.

Countries/Regions	Climate Finance Strategy
China	"Guiding Principles to Promote Climate Investment and Finance" (October 2020)
Hong Kong SAR	"Strategic Plan to Strengthen Hong Kong's Financial Ecosystem to Support a Greener and More Sustainable Future" (December 2020)
Indonesia	"Mitigation Fiscal Framework and Public Climate Finance" (2012 and 2020)[1]
Korea	"Green Finance Strategy" (January 2021); "ESG Infrastructure Expansion Plan" (August 2021)[2]
Malaysia	"Financial Sector Blueprint 2022-2026" (2022)[3]
Mongolia	"National Sustainable Roadmap" (March 2022)
Philippines	"Sustainable Finance Roadmap" (2021); "Sustainable Finance Framework" (2022)
Thailand	"Transitioning towards Environmental Sustainability Under the New Thai Financial Landscape" (2022)[4]
Vietnam	"National Green Growth Strategy for 2021-2030 Period, with a Vision by 2050" (January 2021), "Financial Strategy for 2030" (March 2022), "The National Strategy for Climate Change Until 2050" (July 2022)

Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: The survey was sent to 19 countries: Australia, Hong Kong SAR, Japan, Korea, New Zealand, Singapore, Macao SAR, China, India, Indonesia, Malaysia, Philippines, Thailand, Vietnam, Bangladesh, Cambodia, Lao PDR, Maldives, Mongolia, with the highlighted countries providing responses.
[1]Ministry of Finance, Indonesia.
[2]Korean Authorities (Financial Services Commission and Ministry of Environment).
[3]Bank Negara Malaysia.
[4]Bank of Thailand.

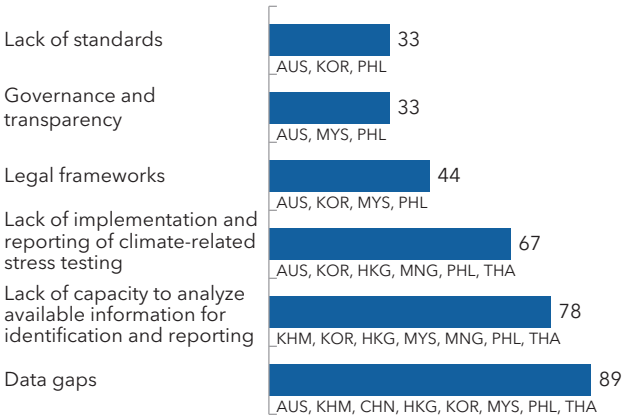
Annex Table 1.2. Main Challenges for Accessing Climate Finance Identified by the Government

	HKG	JPN	KHM	KOR	MNG	MYS	PHL	THA	VNM
Lack of data and information to assess exposure of economy to climate risks	■	■		■		■		■	■
Lack of capacity or expertise to estimate climate-related risks in the economy	■			■		■	■	■	
Lack of fiscal resources dedicated to climate action		■	■		■	■			■
Lack of industry-wide standards and regulations on climate finance products and market platforms					■	■	■	■	■
A green taxonomy has not been established	■		■				■		■
High cost of issuing green financial instruments	■	■		■				■	

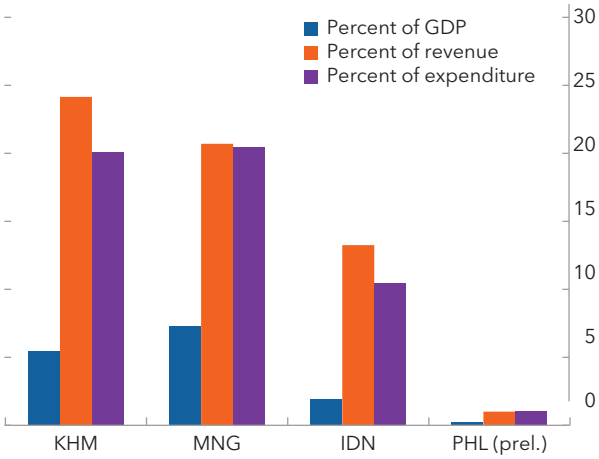
Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the table use International Organization for Standardization (ISO) country codes.

Annex Figure 1.1. Key Finding 1

1. A Total of 89 Percent of Central Banks and Financial Regulators Cite Macro-critical Data Gaps as the Most Important Challenge When Introducing Climate Disclosures
(Percent of total respondents)



2. Only Four Countries Report Estimates of Total Financing to Meet Mitigation and Adaptation Targets
(Percent)

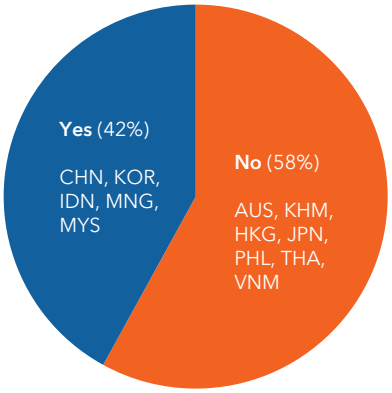


Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex Figure 1.2. Key Finding 2
(Percent of total respondents)

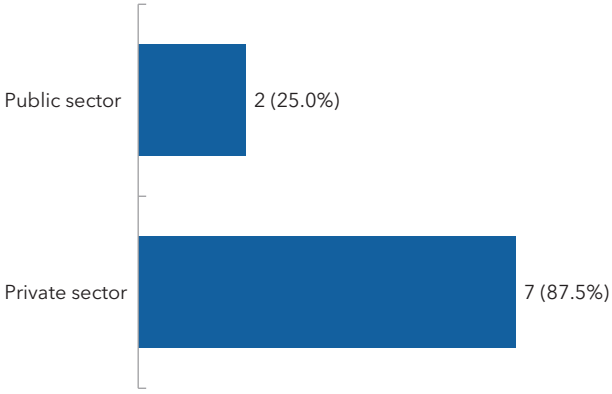
Gaps in taxonomy and disclosures are widely acknowledged across Asia-Pacific.

1. Countries with Climate Taxonomy



(AUS, HKG, THA, PHL, VNM in progress)

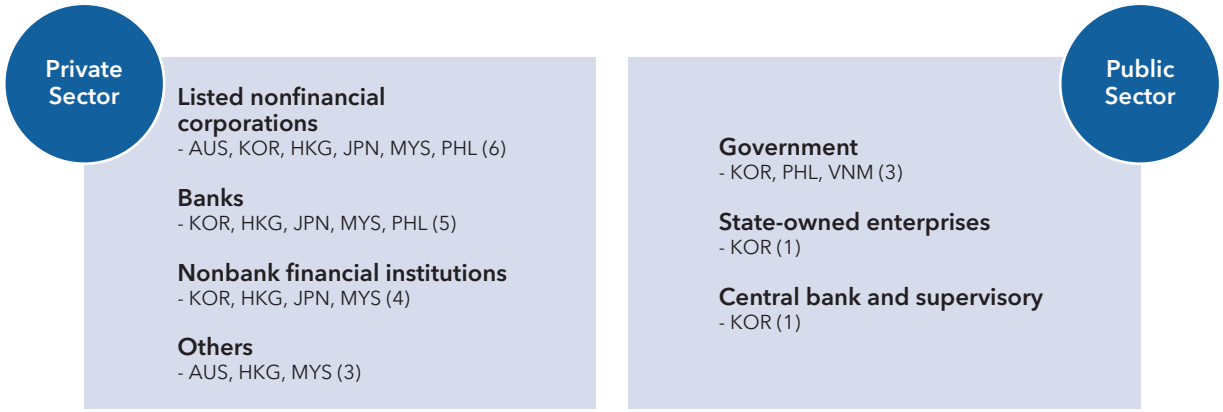
2. Climate Disclosure Framework Exists in Public and/or Private Sectors



Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: In panel 2, the granular data also show Korea disclosing for public sector entities. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex Figure 1.3. Key Finding 3: Climate Disclosure Required by Law or Regulation

1. By Sector



2. Within the Private Sector

Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. NBFIs = nonbank financial institutions.

Annex Figure 1.4. Key Finding 4
(Percent of total respondents)

Inadequate institutional coordination presents a challenge and countries emphasize the need for an oversight committee.

75 Percent Had a Climate Finance Strategy

- CHN, IDN, KOR, HKG, MYS, MNG, PHL, THA, VNM (9)

64 Percent Few Reported an Oversight Committee

- IDN, KOR, MYS, MNG, PHL, VNM, THA (7)

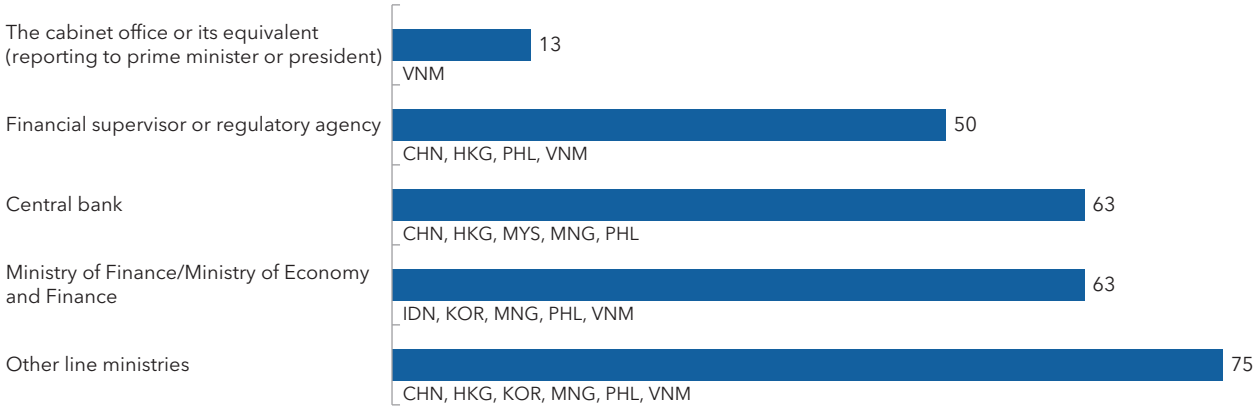
78 Percent Many Identified Necessary to Have an Oversight Committee

- KHM, KOR, MYS, MNG, PHL,THA, VNM (7)

Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex Figure 1.5. Key Finding 5: Agencies Involved in Implementing Climate Finance Strategy
(Percent of total respondents)

There is a lack of cohesion across ministries and agencies involved in implementing climate finance strategy.

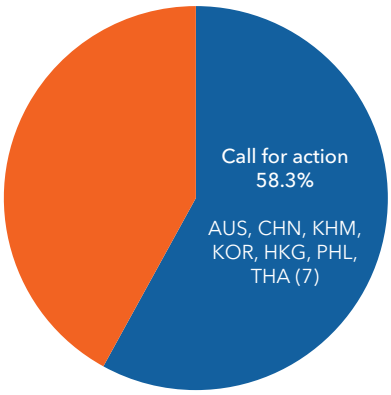


Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

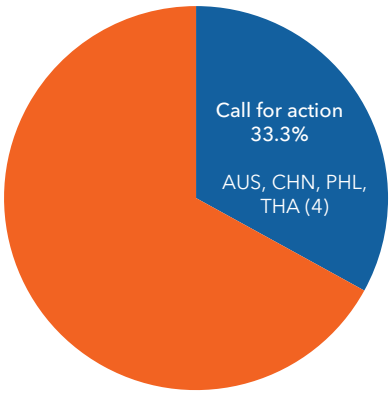
Annex Figure 1.6. Key Finding 6
(Percent of total respondents)

Respondents prefer peer-learning opportunities to address capacity gaps.

1. Countries Favoring Peer-Learning/Collaboration on Taxonomy



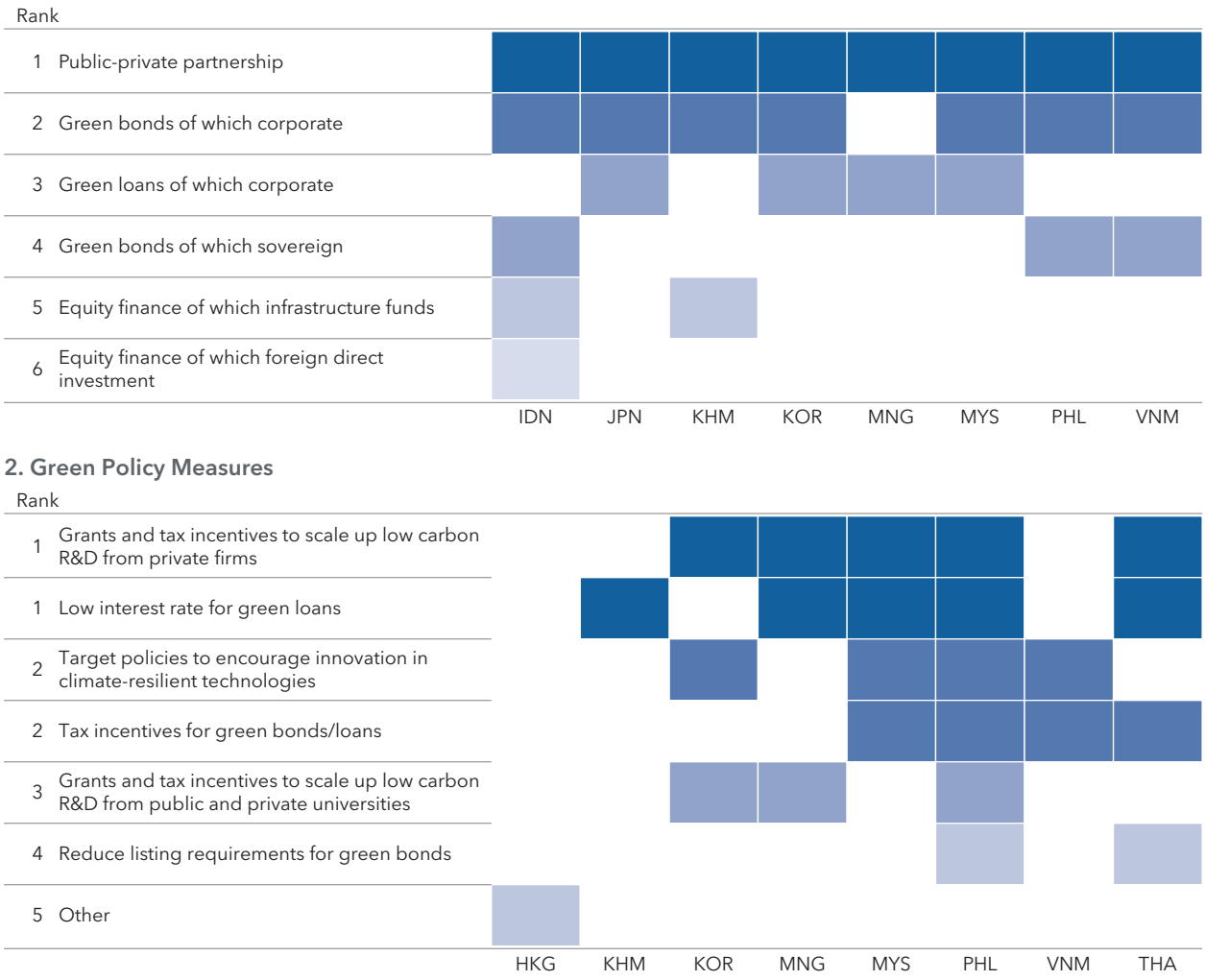
2. Countries Favoring Peer-Learning/Collaboration on Harmonizing Disclosures



Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex Figure 1.7. Key Finding 7: Role of Government in Promoting Climate Finance

Respondents prefer using public-private partnerships, grants, tax incentives, and low interest-rate green loans to raise climate finance.

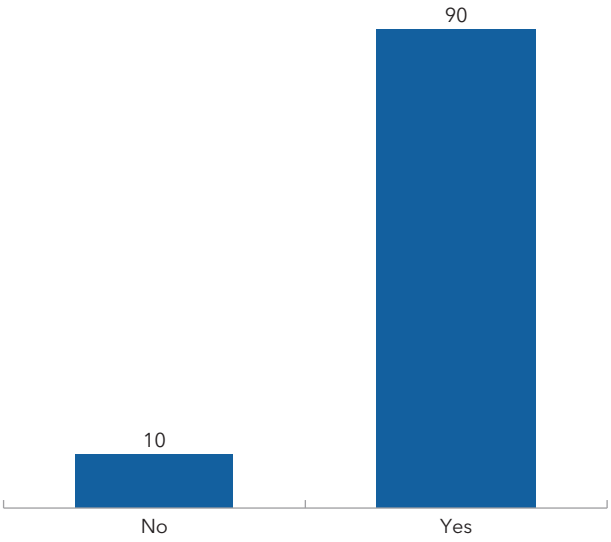


Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. R&D = research and development.

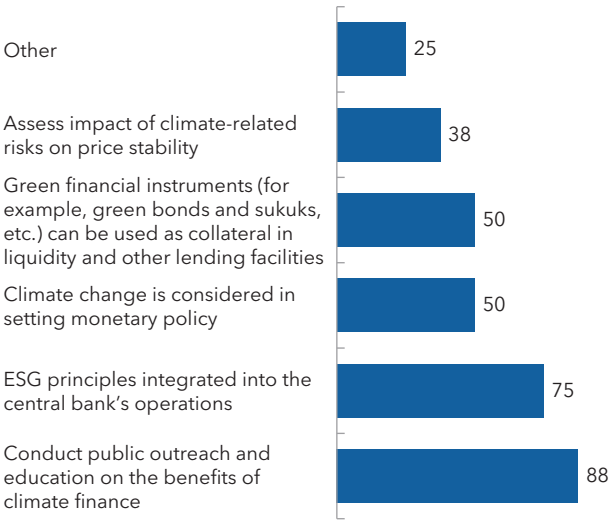
Annex Figure 1.8. Key Finding 8.1: Role of Central Banks in Promoting Climate Finance
(Percent of total respondents)

Asian central banks and supervisory or regulatory agencies consider climate change a core responsibility and are actively taking necessary steps to promote climate finance.

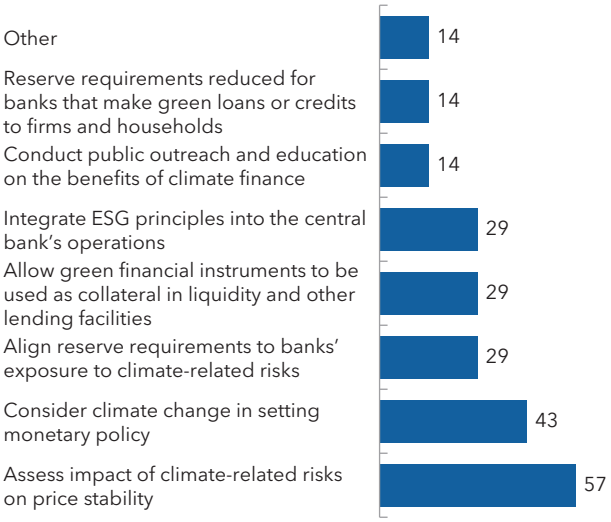
1. Central Banks See Climate Change Action as Being Consistent with Responsibilities



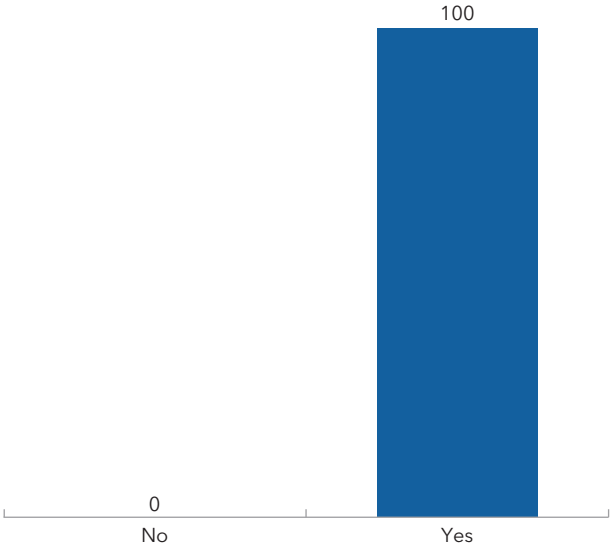
2. Actions that the Central Bank Has Already in Place to Actively Promote Climate Finance



3. Actions that the Central Bank Is Considering to Actively Promote Climate Finance

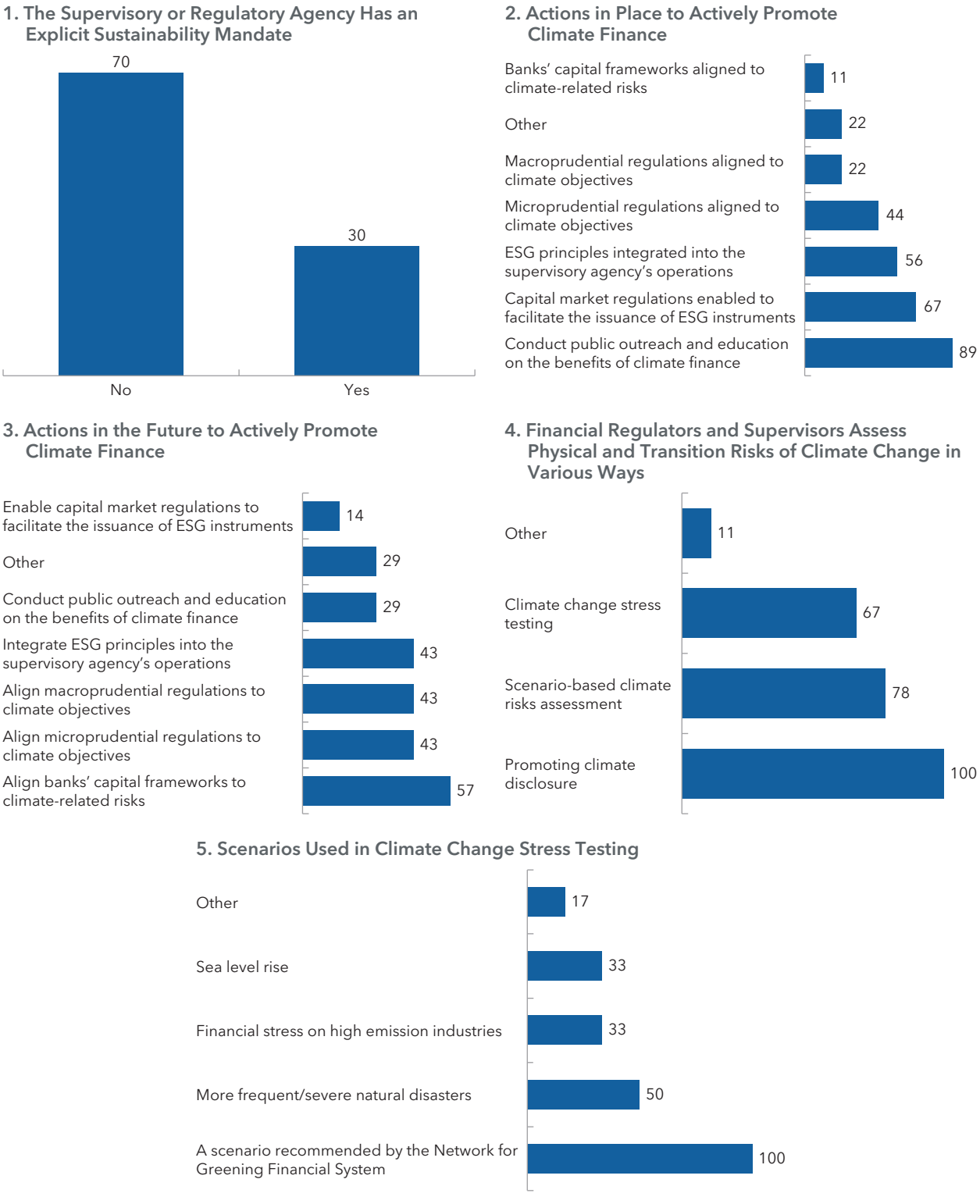


4. The Supervisory or Regulatory Agency Sees Climate Change Action as Being Consistent with Its Responsibilities



Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: ESG = environmental, social, and governance.

Annex Figure 1.9. Key Finding 8.2: Role of Financial Supervisors and Regulators in Promoting Climate Finance
(Percent of total respondents)

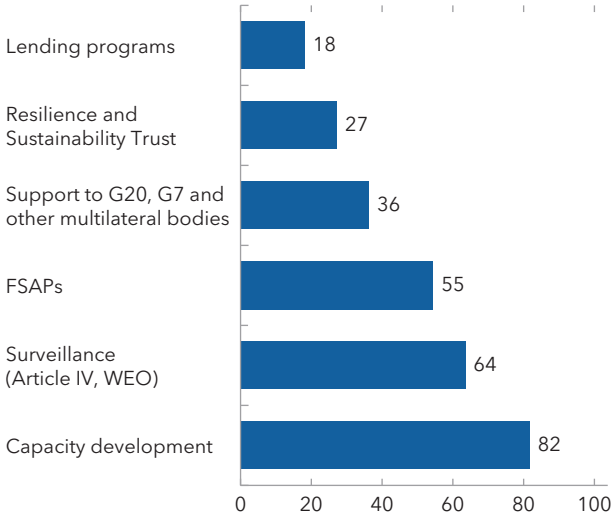


Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: ESG = environmental, social, and governance.

Annex Figure 1.10. Key Finding 9: Role of Multilateral Institutions

Respondents overwhelmingly select "capacity development" as the main form of support from the IMF and other multilaterals.

1. Areas in Which the IMF Can Assist Country Authorities in Mobilizing Climate Finance
(Percent of total respondents)



2. Areas in Which All Other International Financial Institutions Can Assist Country Authorities in Mobilizing Climate Finance
(Percent of total respondents)

Respondents rank peer-learning opportunities on risk assessment and monitoring of climate change as a priority.

3. Areas of Climate Finance the Country Would Seek Knowledge and Experience from Other Countries in the Region
(Rank by priority)

	AUS	CHN	HKG	KHM	KOR	MNG	MYS	PHL	THA
Risk assessment and monitoring of climate change	Rank 2	Rank 1	Rank 1	Rank 5	Rank 3	Rank 1	Rank 1	Rank 5	Rank 1
Climate disclosure and compliance	Rank 3	Rank 2	Rank 2	Rank 2	Rank 5		Rank 5	Rank 6	Rank 3
Financial regulations to promote sustainability	Rank 5		Rank 4	Rank 4	Rank 6	Rank 3	Rank 2	Rank 4	Rank 4
Monetary policy to promote a green economy	Rank 6		Rank 6	Rank 6	Rank 2	Rank 4	Rank 4	Rank 3	Rank 5
Climate taxonomy	Rank 1	Rank 3	Rank 3	Rank 1	Rank 4		Rank 6	Rank 1	Rank 2
ESG investing and market development	Rank 4		Rank 5	Rank 3	Rank 1	Rank 2	Rank 3	Rank 2	Rank 6
Other	Rank 7		Rank 7		Rank 7				

Overall Rank	Area
1	Risk assessment and monitoring of climate change
2	Climate taxonomy
3	ESG investing and market development
4	Climate disclosure and compliance
5	Financial regulations to promote sustainability
6	Monetary policy to promote a green economy

Source: IMF-Asia Pacific Department in-house survey of country authorities (December 2022).
Note: ESG = environmental, social, and governance; FSAP = Financial Sector Assessment Program; G7 = Group of Seven; G20 = Group of Twenty; SDG = Sustainable Development Goal; WEO = *World Economic Outlook*.

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