Green finance for emerging and developing economies:

Rethinking macroprudential rules

Report

Contents

Executive summary

As the climate crisis accelerates, emerging and developing economies (EMDEs) are facing the dual challenge of extreme climate vulnerability and insufficient access to green finance. Despite contributing least to global emissions, least developed countries (LDCs) and small island developing states (SIDS) suffer the most severe climate impacts and receive the least support in terms of climate finance. Meanwhile, macroprudential financial regulations – originally designed to safeguard stability – are inadvertently exacerbating these inequalities by penalising investment in vulnerable countries. One of the most significant barriers identified through stakeholder consultations is the elevated cost of capital faced by banks financing climate projects in EMDEs. High regulatory capital charges, driven by sovereign risk ratings and standardised Basel III requirements, amplify perceived risks and make green lending disproportionately expensive in these markets. Addressing these capital cost asymmetries is essential to unlock private investment for climate-aligned development.

This report examines how macroprudential regulations can be recalibrated to support climate-aligned and inclusive investment flows in EMDEs. It provides a comparative analysis of 40 countries – spanning OECD economies, emerging markets, LDCs and SIDS – and evaluates the transmission of climate risks through financial systems, the adoption of climate-related financial policies and regulatory readiness.

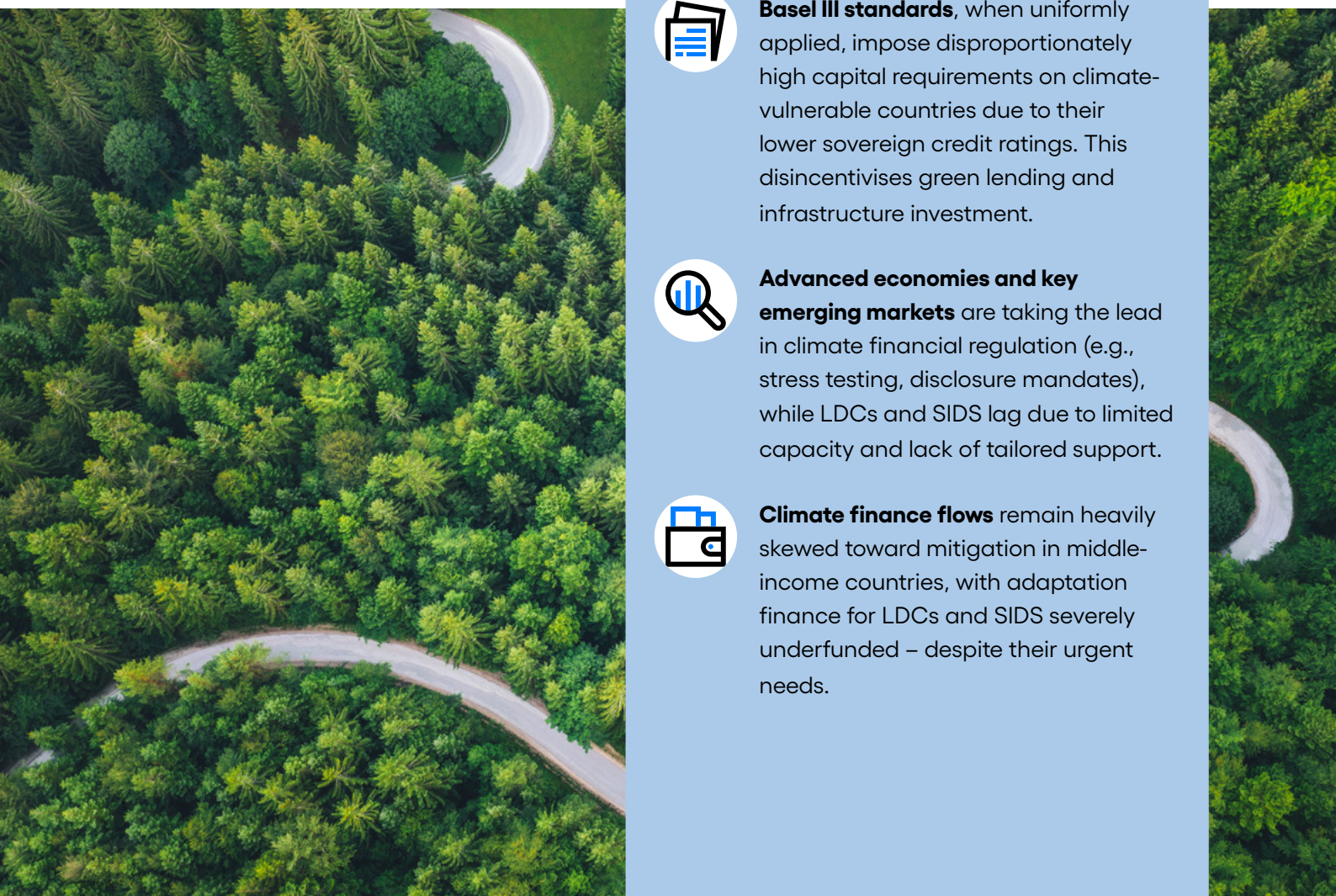
Key findings

Climate-related financial risks are insufficiently integrated into global regulatory frameworks. Physical and transition risks remain underpriced in both risk-weighted capital requirements and supervisory practices.

Basel III standards, when uniformly applied, impose disproportionately high capital requirements on climate-vulnerable countries due to their lower sovereign credit ratings. This disincentivises green lending and infrastructure investment.

Advanced economies and key emerging markets are taking the lead in climate financial regulation (e.g., stress testing, disclosure mandates), while LDCs and SIDS lag due to limited capacity and lack of tailored support.

Climate finance flows remain heavily skewed toward mitigation in middle-income countries, with adaptation finance for LDCs and SIDS severely underfunded – despite their urgent needs.



Policy recommendations:

1. **Adjust Basel III risk weights** to account for climate vulnerability and verified green investments, lowering regulatory barriers for climate finance in SIDS and LDCs.

2. **Promote proportionate risk reflection in prudential frameworks** by recalibrating Basel III risk-weighting methodologies to better recognise the de-risking role of credit enhancement tools – such as guarantees, blended finance instruments and insurance mechanisms. These instruments can substantially lower actual default risk in climate projects, yet their mitigating effects remain insufficiently acknowledged in current capital adequacy calculations.

3. **Deploy climate-aligned macroprudential tools**, including brown penalising and green supporting factors, climate stress tests and climate-adjusted liquidity rules, tailored to local contexts.

4. **Mandate climate-related disclosures** and integrate climate risk into supervisory review processes (Pillar 2), especially in high-emission and high-risk jurisdictions.

5. **Support Just Transition outcomes** by embedding social equity criteria in macroprudential tools and safeguarding access to finance for micro-, small- and medium-sized enterprises (MSMEs) and communities affected by decarbonisation.

6. **Strengthen institutional capacity in developing countries** and align international climate funds with local financial systems to improve access, pipeline readiness and regulatory coherence.

Conclusion

If global macroprudential policy continues to ignore climate vulnerability and investment asymmetries, the risk of destabilising climate shocks and an unjust transition will grow. Addressing the capital cost asymmetry and incorporating the de-risking impact of credit-enhancement mechanisms within Basel III would send a strong global signal that prudential regulation can support both stability and sustainability. By embedding proportionate risk reflection and acknowledging guarantees and blended-finance tools, regulators can unlock climate investment in EMDEs without compromising prudential integrity. Recalibrating financial regulation is essential – not just to manage climate risk – but to enable equitable, sustainable development. This report provides a roadmap for doing so, urging coordinated action across regulators, central banks, international financial institutions and donor agencies.

1. Introduction

The global financial architecture is at a turning point as climate-related risks increasingly challenge the stability and allocative efficiency of financial markets. Climate change imposes both physical risks – through extreme weather events and long-term environmental degradation – and transition risks, stemming from policy shifts, technological disruptions and investor sentiment changes (NGFS, 2019; Bolton et al., 2020). These risks have far-reaching implications for financial stability and economic development, particularly in EMDEs, where financial systems are less resilient and capital needs for green investment are most urgent (UNDP, 2023; IMF, 2021).

The Paris Agreement's Article 2.1(c) emphasises the alignment of financial flows with low-emission, climate-resilient development pathways. However, despite rising global commitments to sustainable finance, actual flows to EMDEs remain inadequate. The United Nations (UN) estimates that developing countries need over US$4 trillion annually to meet the Sustainable Development Goals (SDGs), yet actual private climate investment remains a fraction of this (UNCTAD, 2022). A growing literature suggests that current macroprudential frameworks – designed primarily for crisis prevention and systemic risk mitigation – may unintentionally hinder green investment, particularly in financially constrained contexts (D'Orazio & Popoyan, 2019; Monasterolo & Battiston, 2020, Bardoscia et al., 2025).

Macroprudential regulation plays a critical role in shaping investment flows by influencing capital requirements, risk weightings and credit allocation mechanisms (Borio, 2003; Schoenmaker & Van Tilburg, 2016; Popoyan et al., 2017, 2020). Yet most global financial regulations, particularly the Basel III standards, fail to incorporate climate-related financial risks in a systematic and forward-looking manner (BCBS, 2022; BIS, 2021; Campiglio et al., 2018).

This regulatory gap leads to two paradoxes:

(1) climate-vulnerable countries face disproportionately high capital charges, limiting investment where it is most needed for adaptation and resilience (Volz et al., 2020; D'Orazio & Popoyan, 2019) and
(2) climate risks remain mispriced or omitted, exposing financial systems to destabilising shocks and undermining transition pathways (Battiston et al., 2017; NGFS, 2020).

The Network for Greening the Financial System (NGFS) has repeatedly called for integrating climate risk into supervisory and prudential frameworks, but uptake remains uneven, especially in low-income and small island economies (NGFS, 2022b).

Moreover, the design of macroprudential instruments often reflects the institutional capacity of advanced economies, neglecting the specific vulnerabilities, credit constraints and governance structures of EMDEs (Carney, 2015; Krogstrup & Oman, 2019). Countries with low credit ratings and high climate risk profiles – such as LDCs and SIDS – struggle to attract green capital under existing risk-weighted frameworks. These constraints are further compounded by complex application procedures for international climate funds and limited national capacity for project pipeline development (OECD, 2023).

This report seeks to address these urgent challenges by critically assessing how macroprudential regulations can be recalibrated to align financial stability with climate objectives in EMDEs. Drawing on a comparative analysis of 40 countries – including member countries of the Organisation for

Economic Co-operation and Development (OECD), LDCs, SIDS and emerging markets – this report identifies key regulatory bottlenecks, evaluates the diffusion of climate-related financial policies and proposes context-sensitive reforms. In doing so, it contributes to the growing academic and policy literature calling for a green macroprudential paradigm that is not only risk-sensitive but also development-oriented (Campiglio et al., 2018; D'Orazio, 2023b).

As financial regulators around the world confront the dual challenge of safeguarding stability and enabling a just and orderly transition, this report provides a roadmap for making macroprudential regulation a catalyst – rather than a constraint – for sustainable development.

The remainder of this report is structured as follows:

Section 2 outlines the transmission channels through which climate-related risks affect financial stability and critically examines the limitations of the current macroprudential framework, particularly within the Basel III architecture. It maps these risks onto existing regulatory instruments across the three Basel pillars, identifying both implementation gaps and reform opportunities. **Section 2.1** sets out the key categories of climate-related financial risk and clarifies the role of macroprudential regulation in addressing them. **Section 2.2** introduces a typology of countries based on climate vulnerability, institutional capacity and financial system development, motivating differentiated regulatory approaches. **Section 2.3** details the framework for cross-country data collection and the taxonomy of climate-related financial policies used to assess adoption across 40 jurisdictions.

Section 3 analyses the current investment climate and regulatory challenges in EMDEs, focusing on the misalignment between emissions, climate vulnerability and access to finance, and examining how existing macroprudential rules can contribute to capital misallocation.

Section 4 develops policy pathways for climate-aligned macroprudential reform, including innovative prudential approaches, differentiated capital treatment, policy guardrails to preserve financial soundness, and complementary risk-sharing instruments to de-risk green investment.

Section 5 translates these insights into targeted, context-sensitive policy recommendations tailored to OECD economies, emerging economies, SIDS and LDCs, alongside cross-cutting priorities for equity, interoperability and institutional readiness.

Finally, **Section 6** concludes by reflecting on the implications of the analysis and outlining a roadmap for regulatory reform that aligns financial stability objectives with global climate and development goals.

2. Transmission mechanism of climate-related risks and their impact on financial stability

Climate-related risks introduce systemic vulnerabilities into economic and financial structures through complex transmission mechanisms. These risks, broadly categorised into transition and physical risks, disrupt economic activities, exacerbate financial instability and challenge the effectiveness of macroprudential regulations in managing capital flows toward sustainable investments. The inability of existing regulatory frameworks to address these dynamics has significant implications for financial stability, particularly in emerging and developing economies where investment flows are critical for climate adaptation and mitigation (Bolton et al., 2020; NGFS, 2021).

Transition risks emerge from shifts in policies, technological advancements and evolving consumer preferences, all of which impose structural changes on economic agents. Stricter climate policies and carbon pricing mechanisms increase compliance costs, rendering certain assets stranded and affecting firms' financial viability. Simultaneously, rapid technological developments accelerate industrial transitions, creating labour market frictions and economic dislocations. The reallocation of capital across sectors reflects shifting investor sentiment and demand structures, influencing financial market stability (Battiston et al., 2017). While developed economies tend to have more structured transition strategies supported by government incentives and sustainable finance initiatives, developing economies face challenges in adapting due to limited financial resources and institutional capacity, leading to heightened economic disruptions and market volatility (IMF, 2021).

Physical risks, resulting from both acute climate events (e.g., floods, wildfires, storms) and chronic environmental changes (e.g., sea level rise, temperature increases), disrupt production processes, damage infrastructure and reduce labour productivity (Hsiang et al., 2017; IMF, 2020). Supply chain interruptions triggered by extreme weather events contribute to inflationary pressures, particularly in food and energy sectors (ECB, 2021; Mukherjee & Ouattara, 2021). In parallel, gradual environmental degradation leads to capital depreciation and undermines economic growth, heightening socioeconomic instability (Dell et al., 2014; Burke et al., 2015). These climate shocks adversely affect firm balance sheets and household income, increasing default probabilities, impairing asset values, and threatening financial stability (Ciscar et al., 2018; FSB, 2020). In developed economies, catastrophe bonds, reinsurance schemes and diversified capital markets offer some level of climate risk absorption (OECD, 2021). By contrast, developing countries – often more exposed to physical risks – lack access to financial hedging mechanisms and resilient infrastructure, exacerbating economic and financial vulnerability (Hallegatte et al., 2016; NGFS, 2022b).

At the microeconomic level, these disruptions materialise as property damages, income losses and rising legal liabilities. Declining asset values and increased uncertainty influence creditworthiness and investment decisions, amplifying risk exposure in financial institutions. The cumulative impact of these factors generates broader macroeconomic consequences, including productivity declines, capital reallocation inefficiencies and socioeconomic disparities. Developed economies, with diversified financial markets and stronger institutions, are better positioned to manage these risks, whereas developing economies often struggle with credit market contractions and reduced foreign investment inflows, exacerbating capital shortages (Carney, 2015).

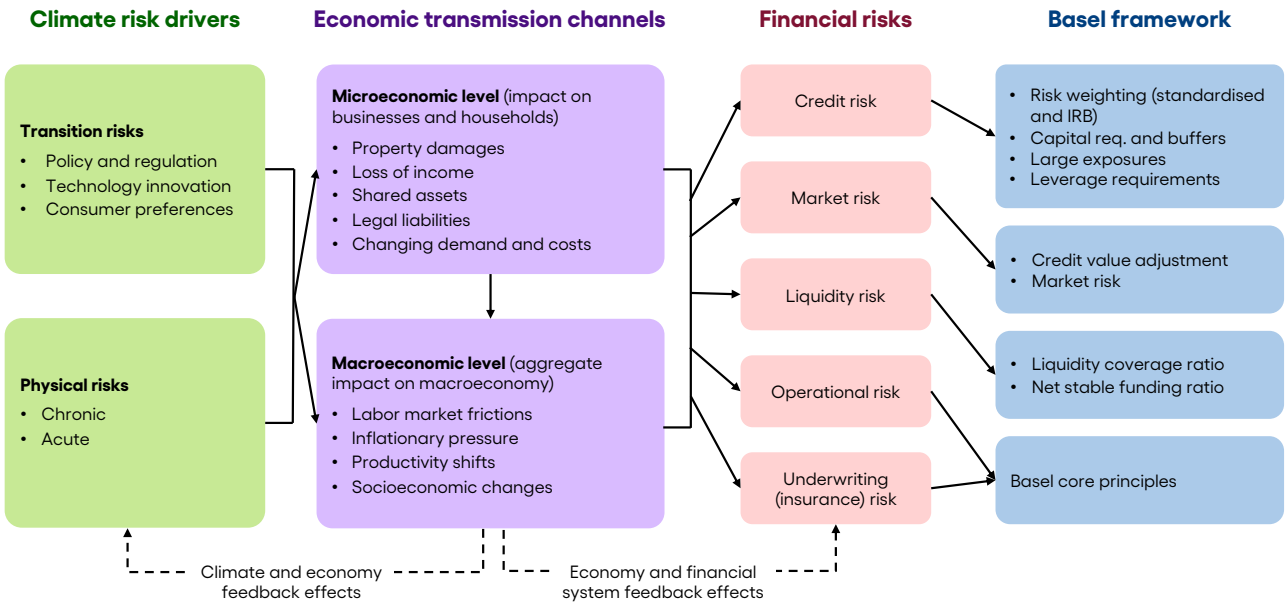
Financial risks arising from climate-related disruptions manifest through multiple channels. Increased default rates on corporate and household debt elevate credit risk, while fluctuations in asset valuations contribute to market volatility. Liquidity risks intensify as firms and households seek financial relief amid economic distress, straining banking sector resilience. Operational risks increase as financial

institutions face physical damages and disruptions in service delivery. Additionally, the insurance sector experiences heightened underwriting risk due to rising claims from climate-related disasters, challenging risk assessment models and pricing strategies (FSB, 2020). In developed economies, central banks and financial regulators increasingly integrate climate risks into stress testing and risk assessment frameworks. However, in developing economies, weak financial sector oversight and limited access to risk-mitigation instruments result in a higher systemic risk exposure (NGFS, 2019).

Despite the clear financial implications of climate risks, macroprudential regulatory frameworks remain insufficiently adapted to address these challenges. The Basel regulatory framework provides mechanisms for risk weighting, capital buffers and leverage requirements, yet it does not explicitly integrate climate-related financial risks into its risk assessment methodologies. This regulatory gap results in the systematic under-pricing of climate risks, leading to the misallocation of capital and insufficient investment in sustainable sectors. The consequences are particularly severe in emerging and developing economies, where the need for climate-resilient investments is most pronounced (BIS, 2021). In developed economies, regulatory advancements, such as the EU Taxonomy for sustainable finance and the Task Force on Climate-Related Financial Disclosures (TCFD), are promoting climate-aware capital allocation, whereas developing economies face barriers to implementing such frameworks due to institutional and economic constraints (IMF, 2021).

The transmission mechanism illustrated in **Figure 1** highlights the interconnectedness of climate risks, economic disruptions and financial vulnerabilities across different economic contexts. Addressing these challenges requires a recalibration of macroprudential policies to incorporate climate risk factors explicitly. While developed economies have made progress in integrating climate risks into financial regulations, developing economies require enhanced international support, capacity-building and investment facilitation to mitigate financial instability. Without such reforms, financial stability will remain precarious and capital flows toward green investments will be constrained, undermining efforts to transition toward a sustainable economic model (NGFS, 2019; IMF, 2021).

Figure 1: Financial risks, climate drivers, their transmission mechanism and financial regulations



Source: Authors' elaboration

2.1. Climate-related financial risks and the role of macroprudential regulation

Climate change poses material financial risks that can manifest through both physical and transition risk drivers (see **Figure 1**). Physical risks, such as acute weather events or chronic environmental degradation, have direct implications for property values, supply chains and business continuity. Transition risks, on the other hand, stem from policy shifts, technological disruption and changing consumer preferences that can render carbon-intensive assets obsolete or unprofitable. These risks transmit to the financial system through microeconomic channels – affecting firms and households via asset damage, income loss, or changing costs – and through macroeconomic shifts, such as inflationary pressures, labour market disruptions or capital depreciation.

These developments challenge the assumptions underpinning traditional risk assessments and demand an evolution of the existing regulatory architecture. Basel III, the prevailing global macroprudential framework, offers several instruments – across its three pillars – that can be adapted to account for climate risks.

Table 1 summarises how different climate-related financial risks map onto the Basel III architecture and how the toolkit can be deployed to mitigate such risks while promoting a green and stable financial system. Table 1 consolidates the mapping between financial risk types, climate-related risk drivers, and relevant Basel III policy responses.

Table 1. Climate-related financial risks, transmission channels and macroprudential responses under Basel III

Financial risk type	Climate risk drivers	Transmission mechanism	Basel III response mechanism	Pillar	Climate policy enhancement
Credit risk	Physical: property damage Transition: stranded assets	Loss of borrower income, asset devaluation, rising default rates	Risk-weighted assets (RWA) calculation, capital buffers, large exposure limits	Pillar 1	Introduce "green supporting" or "brown penalising" factors to adjust RWA in line with climate risk (Battiston et al., 2017; DNB, 2020)
Market risk	Transition risk via repricing of carbon-intensive assets, physical risk-driven volatility	Revaluation of financial instruments, increased volatility in commodity and equity markets	Internal models for market risk, stressed VaR, credit valuation adjustment (CVA)	Pillar 1	Integrate climate scenarios into internal market risk models; apply haircuts for high-carbon exposures
Liquidity risk	Climate events triggering sudden funding outflows	Liquidity crunches during extreme weather or investor runs from high-risk sectors	Liquidity Coverage Ratio (LCR), Net Stable Funding Ratio (NSFR)	Pillar 1	Adjust high-quality liquid asset (HQLA) definitions to include green assets; stress test LCR/NSFR under climate scenarios (NGFS, 2022b)
Operational risk	Disruption from extreme events; cyber risk in green tech transitions	System failures, data breaches, compliance failures	Advanced Measurement Approaches (AMA), standardised approaches	Pillar 1	Update loss databases and scenarios to include climate-related disruptions (ECB, 2020)
Underwriting risk	Increased insurance claims from extreme events; transition-related mispricing	Misestimation of future liabilities; adverse selection	Insurance-specific solvency regulations (Solvency II); capital modelling	Pillar 2	Require forward-looking risk assessments in underwriting processes (EIOPA, 2021)

Source: Authors' elaboration

Pillar 1 is the cornerstone of the Basel III framework and prescribes quantitative requirements for capital, risk-weighted assets, leverage and liquidity. It encompasses the main risk categories – credit, market and operational risks – and mandates banks to hold capital buffers proportionate to these exposures. However, climate risks are often not fully reflected in existing credit ratings or historical loss data, potentially leading to mispriced risks and under-capitalisation. Enhancing Pillar 1 to address climate-related risks involves:

- **Adjusting risk weights:** Introducing "brown penalising" factors (higher capital requirements for carbon-intensive assets) and/or "green supporting" factors (reduced requirements for sustainable assets), as explored by regulators like the European Banking Authority and De Nederlandsche Bank (DNB, 2020).
- **Revising internal ratings-based (IRB) models:** Banks using IRB approaches must update probability of default (PD), loss given default (LGD) and exposure at default (EAD) parameters to incorporate climate risk factors.
- **Market risk capital:** Stress scenarios for market risk must be updated to reflect transition-related shocks (e.g., sudden revaluation of fossil fuel assets) and price volatility from extreme weather events.
- **Operational risk frameworks:** Climate-induced disruptions (e.g., cyberattacks on green infrastructure, flood damage to facilities) should be factored into scenario-based capital calculations.
- **Liquidity measures:** The LCR and NSFR must consider climate-related funding shocks and include green assets in HQLA categories, where feasible.

Beyond traditional risk weighting, a major challenge for EMDEs is the higher regulatory capital cost that banks face when financing climate projects in countries with lower credit ratings. Basel III's standardised approaches often fail to recognise the credit-risk mitigation provided by blended-finance structures, first-loss tranches or multilateral guarantees. Embedding a more proportionate recognition of these instruments within Pillar 1 could materially reduce capital costs for banks and improve the bankability of green projects in developing economies.

Box 1. A note of caution: limitations and risks of green supporting factors

While green supporting factors (GSFs) have gained traction as a policy tool to incentivise sustainable finance – particularly in jurisdictions like China and the EU – their use remains highly debated among regulators and academics. The core idea is to reduce capital requirements for green assets to encourage financial institutions to reallocate credit toward climate-aligned sectors. However, empirical evidence on their efficacy and prudential soundness is mixed.

The European Central Bank (ECB) and the Bank of England (BoE) have raised concerns that GSFs, if not rigorously risk-adjusted, may undermine financial stability by under-pricing risk or distorting credit allocation. The ECB has warned that introducing preferential capital treatment without robust evidence that green assets are intrinsically less risky than their brown counterparts could create new systemic vulnerabilities (ECB, 2021). Similarly, the BoE emphasised that capital requirements should reflect actual risk, not policy preferences, noting that green investments are not inherently safer and may be exposed to transition or technology risks (BoE, 2022).

Moreover, implementation challenges persist. There is still no global consensus on what constitutes a "green" asset, and taxonomies remain uneven across jurisdictions. This risks

regulatory arbitrage or "greenwashing" within banking portfolios, especially in cross-border lending. Green asset performance data also remains limited and inconsistent, hindering reliable calibration of capital relief (NGFS, 2022a).

Despite these concerns, GSFs can play a transitional role when embedded within broader climate risk assessment frameworks, including mandatory disclosures, climate stress testing and risk management reforms. The challenge lies in striking a balance between promoting green finance and safeguarding financial resilience. Regulators may consider time-bound or conditional GSFs or instead prioritise brown penalising factors (BPFs), which align more clearly with the risk-based logic of prudential regulation (D'Orazio & Popoyan, 2019).

A prudent approach would combine targeted incentives for verified low-risk green projects with strong supervisory oversight, to ensure that climate alignment does not come at the expense of systemic stability.

Basel III's Pillar 2 (Supervisory review process) offers additional leeway for national regulators to demand that financial institutions develop robust climate risk management strategies. This includes conducting climate stress tests, enhancing governance and disclosure practices and integrating transition pathways into business model viability assessments. For instance, the ECB (2020) has begun requiring supervised institutions to assess physical and transition risks under adverse scenarios.

Pillar 3 (Market discipline), meanwhile, plays a vital role in promoting transparency. Climate-related financial disclosures – aligned with the TCFD and soon the ISSB standards – can empower investors to allocate capital toward sustainable and resilient firms. Enhanced disclosure also mitigates the risk of greenwashing and promotes market discipline.

By strategically aligning financial regulation with climate goals, climate-related financial policies can serve a dual function: mitigating systemic financial risks and supporting the redirection of capital flows toward sustainable activities. This approach ensures an orderly transition that preserves financial stability and avoids abrupt dislocations in credit and capital markets. At the same time, while macroprudential policies primarily aim to preserve financial stability and mitigate systemic risks, their design and implementation also carry significant distributional consequences. The concept of a "Just Transition" explicitly recognises that transitioning toward a sustainable and low-carbon economy must occur without disproportionately harming vulnerable groups, sectors or regions (Galanis et al., 2025). Macroprudential regulations, if not thoughtfully designed, may unintentionally limit financial access for MSMEs, low-income households and communities heavily dependent on carbon-intensive industries. For instance, higher capital requirements or stricter liquidity ratios targeting brown assets could inadvertently restrict credit availability to small-scale, resource-constrained enterprises lacking immediate alternatives, exacerbating social and economic inequalities.

Therefore, integrating Just Transition Principles into macroprudential frameworks is vital. Practical regulatory adaptations could include employing socially adjusted climate stress tests, differentiated capital charges that reward green investments with demonstrable social co-benefits, or establishing targeted credit facilities that facilitate financial inclusion and resilience among disadvantaged groups. Macroprudential policies thus have the potential not only to redirect capital flows toward climate-aligned sectors but also to support equitable outcomes, ensuring that the economic transition remains inclusive and politically sustainable.

2.2. The global relevance of climate-related financial risks and the case for differentiated policy approaches

While climate-related financial risks are global in nature, their manifestation, materiality and policy relevance vary significantly across countries. As climate change intensifies, so too does the urgency of aligning macroprudential frameworks with both environmental and financial stability goals (NGFS, 2020; IMF, 2023). Understanding how climate risks interact with national financial systems is essential for developing effective regulatory responses that can simultaneously mitigate risks and channel credit toward sustainable development.

This analysis focuses on a strategically selected set of 40 countries, grouped into four categories based on income level, climate vulnerability and financial system development. These groupings reflect meaningful heterogeneity in terms of both exposure to climate-related financial risks and institutional capacity to implement regulatory responses.

The selected countries also reflect key stakeholder regions of interest for the International Chamber of Commerce (ICC), the institutional representative of more than 45 million companies in over 170 countries, and provide a solid foundation for policy benchmarking and engagement.

- **Top OECD economies** with advanced financial systems and increasing exposure to transition risks: United States, United Kingdom, Germany, France, Japan, Canada, Australia, South Korea, Italy and Spain.
- **Key emerging economies** with relatively better credit ratings and dynamic financial systems facing both transition and physical risks: Brazil, Mexico, India, Indonesia, South Africa, Sri Lanka, Turkey, Thailand, Malaysia, Vietnam, China and the Philippines.
- **LDCs** with lower institutional capacity and high vulnerability to physical climate risks and credit market frictions: Bangladesh, Ethiopia, Haiti, Mozambique, Nepal, Senegal, Sudan, Zambia, Madagascar and Rwanda.
- **SIDS** facing existential climate risks and severe financial constraints: Fiji, Jamaica, Mauritius, Maldives, Papua New Guinea, Solomon Islands, Samoa and Vanuatu.

To assess the role of macroprudential regulation in enabling green investment across diverse national contexts, we adopt a unified analytical framework.

For each country group, the authors examine:

1. Climate risk exposure (physical and/or transition risks),
2. Transmission channels to the financial system and macroeconomy,
3. Regulatory readiness and gaps across Basel III pillars,
4. Green investment impact,
5. Policy feasibility and action steps.

This structure enables a comparative, yet context-sensitive analysis of how climate-related financial risks interact with regulatory capacity and investment outcomes, providing a foundation for tailored policy recommendations.

OECD economies: In advanced economies – such as the United States, United Kingdom, Germany, France, Japan and other top OECD countries – the financial sector is highly developed and deeply integrated into global capital markets. Although these countries possess stronger institutional and supervisory capacities, they face significant transition risks. Stricter environmental policies, carbon pricing and changing investor preferences can lead to the rapid repricing of carbon-intensive assets, creating credit and market risks for financial institutions (Battiston et al., 2017; Bolton et al., 2020). At the same time, these economies are at the forefront of designing green taxonomies, integrating climate scenarios into supervisory stress testing and developing climate-aligned capital frameworks (ECB, 2020; NGFS, 2022a).

Climate risk profile: OECD economies – such as the United States, Germany, the United Kingdom, France, Japan and others – are high emitters, both in cumulative and per capita terms. While they are less exposed to acute physical climate risks than LDCs or SIDS, they are particularly vulnerable to transition risks, including rapid decarbonisation policies, shifts in global investor preferences and emerging carbon border adjustment mechanisms.

Transmission channels: The key risks are transmitted through the repricing of carbon-intensive assets and sectors. Financial institutions with large exposures to fossil fuels, carbon-intensive manufacturing or outdated infrastructure face asset write-downs, reduced credit quality and increased volatility in equity and bond markets. As carbon pricing mechanisms tighten, the risks of stranded assets intensify, particularly in energy, transport and heavy industry.

Regulatory readiness and gaps: OECD countries have made substantial progress in integrating climate-related risks into macroprudential regulation. Many jurisdictions have adopted or are piloting:

- Climate stress tests under Pillar 2 (e.g., ECB, BoE)
- Climate-related disclosure regimes aligned with TCFD and ISSB under Pillar 3
- Preliminary steps toward adjusting capital frameworks, though green supporting/brown penalising factors remain contested under Pillar 1.

However, the current implementation often lacks harmonisation and remains voluntary in some jurisdictions, with limited binding obligations for smaller institutions or non-bank financial actors. There is also limited progress in translating scenario analysis results into actual regulatory constraints or credit guidance.

Investment impact: Advanced institutional capacity has enabled better green capital flows, particularly in countries with green taxonomies and disclosure mandates. However, financial regulation still largely favours market neutrality, meaning there is no explicit preferential treatment for sustainable investments under Basel III. As a result, the financial system continues to under allocate capital to sectors like renewable infrastructure, nature-based solutions, or adaptation.

Policy feasibility and action steps: Given their institutional and supervisory strength, OECD countries are well positioned to:

- Move from voluntary to mandatory climate stress tests across financial sectors,
- Implement brown penalising factors for carbon-intensive exposures, justified by risk-based logic,
- Expand the scope of high-quality liquid assets to include certified green instruments,
- Use Pillar 2 guidance to nudge institutions toward sustainability-aligned lending.

International regulatory forums (e.g., BCBS, NGFS) should coordinate on setting minimum climate risk integration standards for OECD jurisdictions, both to prevent regulatory arbitrage and to signal leadership to the Global South.

Emerging economies such as Brazil, India, Indonesia and South Africa face both opportunities and risks in the climate transition. While these countries generally possess more diversified financial systems and higher credit ratings, they remain heavily reliant on fossil fuels and carbon-intensive sectors (Lamperti et al., 2021). Transition risks – such as stranded assets and carbon taxes – can generate sectoral credit exposures and sovereign risk spillovers, while physical risks remain significant in climate-sensitive sectors like agriculture and real estate (BIS, 2021). Yet these economies also have immense potential to scale up investment in renewables, green infrastructure and nature-based solutions, especially if supported by forward-looking macroprudential regulation and international cooperation (UNEP FI, 2022).

Climate risk profile: Emerging economies are among the largest current emitters, often with fossil-fuel-intensive energy systems and high industrial output (e.g., China, India, South Africa). They face both transition and physical risks: the former through exposure to stranded assets and the latter via climate-sensitive sectors like agriculture, water and coastal infrastructure. Their risk exposure is compounded by rapid urbanisation, income inequality and sectoral dependence on carbon-intensive exports.

Transmission channels: Transition risks affect these economies via potential capital flight from carbon-intensive sectors; revaluation of fossil fuel reserves and fiscal pressures from declining revenues in resource-based economies

Physical risks are transmitted through droughts and extreme weather affecting agriculture and food prices; increased credit default probabilities in climate-vulnerable regions and higher sovereign risk premiums linked to climate vulnerability, reducing access to global finance.

These risks feed into systemic financial instability via asset devaluation, reduced bank collateral values and macroeconomic volatility.

Regulatory readiness and gaps: Many emerging economies – especially China, Brazil and South Africa – are pioneering climate-financial regulation, including environmental, social and government (ESG) disclosure mandates (Brazil), climate scenario analyses and stress tests (China, India) and directed credit and green lending quotas (China).

However, these advances are uneven and often fragmented. Challenges include limited supervisory capacity outside central hubs, weak enforcement of disclosure norms, incomplete taxonomies or green classification systems and minimal integration of climate risk into capital adequacy (Pillar 1).

In most cases, Basel III implementation is still ongoing, and adaptation to climate risk is not yet embedded in core regulatory instruments.

Investment impact: Emerging economies have attracted significant climate finance, particularly in renewable energy and green infrastructure. This has been enabled by better credit ratings, large market size and strategic relevance. However, most green finance comes via private loans or equity with high return expectations, leaving adaptation and resilience projects underfunded.

The lack of fully integrated climate-financial regulation leads to high cost of capital for green MSMEs, sectoral credit concentration in “bankable” green assets (e.g., solar farms), neglecting distributed or

social infrastructure and limited mainstreaming of Just Transition considerations.

Policy feasibility and action steps: Many emerging economies are ready to scale up green macroprudential tools but need:

- Technical assistance to improve supervisory capabilities,
- Harmonisation of taxonomies with global frameworks (e.g., EU, ISSB),
- Phased implementation of green supporting factors in capital rules,
- Expansion of blended finance facilities to de-risk adaptation investments,
- Socially targeted instruments (e.g., concessional loans to green SMEs) to support inclusive transition.

International cooperation is key. Development banks and G20 climate finance initiatives should coordinate with national regulators to ensure that macroprudential reform is supported by adequate liquidity and market development tools.

LDCs such as Bangladesh, Ethiopia, Mozambique and Nepal face a different set of challenges. These economies are disproportionately vulnerable to physical risks, including floods, droughts and extreme weather events that damage infrastructure, depress productivity and exacerbate sovereign risk (UNEP FI & Oliver Wyman, 2022). Their limited fiscal space and institutional capacity make it difficult to absorb shocks or mobilise private investment for adaptation and resilience (IMF, 2022). In such contexts, climate-related macroprudential policies must be carefully calibrated to avoid exacerbating credit constraints, while facilitating access to climate finance and concessional lending for green investment (Hepburn et al., 2020; Galati & Moessner, 2013).

Climate risk profile: LDCs are highly exposed to physical climate risks – such as droughts, floods and cyclones – due to geography, reliance on natural resources and low levels of adaptive infrastructure. Despite contributing only around 3% of global greenhouse gas (GHG) emissions, they are among the most climate-vulnerable. Transition risks are minimal domestically due to low industrialisation but can emerge via external channels, such as shifts in export demand or global energy markets.

Transmission channels: Physical risks affect agriculture, infrastructure, water systems and human health – translating into economic shocks, increased food insecurity and supply disruptions. These shocks reduce fiscal space, heighten sovereign risk and raise public debt burdens, triggering downgrades and higher external borrowing costs. At the financial system level, impacts include rising non-performing loans (particularly in rural/agricultural portfolios); liquidity strains in small and informal banks and reduced collateral values and insurance coverage gaps. Due to limited financial deepening, even minor economic disruptions can cascade into systemic fragility.

Regulatory readiness and gaps: Macroprudential frameworks in LDCs are typically nascent or underdeveloped since Basel III is often partially implemented or adapted with simplified standards, and supervisory capacity is constrained by staffing, data quality and ICT systems. Moreover, climate risks are not integrated into capital adequacy, stress testing or disclosure regimes. At the same time, green taxonomies, ESG reporting rules and climate scenario exercises are generally absent

A few countries have taken donor-supported steps (e.g., pilot stress tests or green bond frameworks), but these are exceptions.

Investment impact: Because of their risk profile and institutional constraints, LDCs receive limited private green investment, especially for adaptation projects. Key consequences include heavy

reliance on concessional finance and grants; lack of "bankable" project pipelines due to technical capacity gaps, climate finance mostly bypassing domestic financial institutions and high-risk weights on LDC sovereign bonds under Basel rules (often 100–150%) deter international bank lending. This regulatory design unintentionally penalises green infrastructure in LDCs while failing to account for their urgent adaptation needs.

Policy feasibility and action steps: LDCs face steep constraints in implementing complex macroprudential tools. Yet meaningful actions are possible with international support:

- Short-term priorities:
  - Build supervisory and risk assessment capacity through the International Monetary Fund (IMF), World Bank and Alliance for Financial Inclusion (AFI)
  - Incorporate climate risk into basic financial sector diagnostics
  - Simplify and tailor regulatory expectations using proportionality principles
  - Create green project preparation facilities and technical assistance hubs
- Medium-term goals:
  - Develop national green taxonomies aligned with international standards
  - Launch climate disclosure pilots with major state-owned or systemic banks
  - Enable national development banks to issue green bonds with guarantees
- Long-term feasibility:
  - Advocate for adjustments to Basel sovereign risk weights reflecting climate vulnerability
  - Coordinate with donors to channel concessional finance through local financial systems, strengthening domestic financial intermediation

A "just green regulation" agenda for LDCs must focus on flexibility, simplification and international coordination, rather than imposing advanced-economy templates. The goal should be to gradually build a green financial architecture that is robust, inclusive and realistic for institutional conditions.

SIDS like Fiji, Jamaica and the Maldives are at the epicentre of climate-induced systemic risk. Highly exposed to rising sea levels and increasingly intense storms, these countries face compounding vulnerabilities – geographic isolation, narrow economic bases and high debt burdens (Batten et al., 2016; IMF, 2023). Financial systems in SIDS are often shallow, dominated by a few commercial banks and reliant on external financing. Embedding climate risk into regulatory frameworks can help these economies crowd in international capital through green bonds, catastrophe-linked instruments and blended finance solutions (UNDP, 2021).

Climate risk profile: SIDS face some of the most acute physical climate risks globally – rising sea levels, cyclones, saltwater intrusion and coastal erosion pose existential threats to their economies and populations. Their small landmass, high population densities in coastal areas and reliance on climate-sensitive sectors such as tourism, agriculture and fisheries make them uniquely vulnerable. Although they are negligible GHG emitters, they are disproportionately exposed to climate-driven sovereign and systemic risks.

Transition risks are less prominent domestically due to limited fossil fuel production or heavy industries but imported transition risks arise from global fossil fuel price volatility; changing demand in tourism-linked transport sectors (e.g., aviation decarbonisation) and trade and finance reconfigurations tied to green standards.

Transmission channels: Physical risks directly affect public infrastructure, housing, utilities and small businesses, resulting in widespread damage, fiscal shocks and credit stress. Financial transmission includes collateral destruction and loan defaults after extreme weather events; increased demand for liquidity support by domestic banks post-disaster and repricing of sovereign bonds due to climate risk, causing spreads to rise.

SIDS' narrow economic bases and shallow financial sectors amplify these shocks, often triggering a vicious cycle of debt, reconstruction and limited investment in resilience.

Regulatory readiness and gaps: Most SIDS have basic financial regulation frameworks, but limited capacity to expand into green macroprudential territory since implementation of Basel II or simplified Basel III is often incomplete. Central banks rarely conduct climate stress tests or integrate physical risk into financial supervision and disclosure, taxonomy and scenario analysis remain largely unexplored. To compensate this disaster risk financing tends to focus on fiscal instruments (e.g., CAT bonds), with little integration into financial regulation

Some SIDS (e.g., Barbados, Fiji) have shown innovation via blue bonds or climate-resilient infrastructure planning, but these are exceptional and externally supported.

Investment impact: Despite their high need, SIDS face significant barriers to attracting climate investment, due to small market size and low project scale, deterring large institutional investors; high perceived risk from both physical vulnerability and sovereign credit constraints; lack of domestic green finance ecosystems – few banks have climate-aligned lending or insurance portfolios; overdependence on international aid or concessional finance, often bypassing national financial institutions

This leads to underinvestment in adaptation, resilience and energy transition – areas most critical for their survival and economic diversification.

Policy feasibility and action steps: Due to their structural and capacity limitations, green macroprudential strategies in SIDS must be highly tailored and supported by external actors.

- Short-term priorities:
  - Integrate climate risk into national financial inclusion strategies
  - Establish partnerships with regional central banks and international financial institutions (IFIs) to co-develop simplified stress test tools
  - Expand post-disaster liquidity facilities for banks and MSMEs (e.g., emergency lending windows)
  - Develop regional taxonomies and ESG reporting guidance through shared technical platforms
- Medium-term goals:
  - Scale up sovereign-backed green or blue bonds with risk guarantees
  - Leverage diaspora savings and remittance flows for green development funds
  - Pilot blended finance models for resilient housing and renewable energy projects
- Long-term feasibility:
  - Advocate for a climate vulnerability index to be embedded in credit rating agency methodologies and Basel sovereign risk weights
  - Develop resilience-based financial supervision frameworks that reward investment in physical adaptation (e.g., flood-proofing, microgrids)
  - Build climate-aligned reserve management strategies within central banks

SIDS require a protective and enabling financial regime that recognises their climate vulnerabilities, scale limitations and geopolitical constraints. Regional cooperation, multilateral support and simplified regulatory frameworks are key to building resilience without overwhelming supervisory capacity.

This differentiated analysis underscores the need for a more granular understanding of regulatory environments, institutional capacity and investment barriers across jurisdictions. Building on this foundation, the next section provides a cross-country data-driven analysis of climate-related financial policy implementation, enabling identification of policy diffusion patterns, regulatory innovation and structural gaps. Taken together, these four country groupings illustrate the importance of tailored macroprudential approaches that reflect the specific climate vulnerability, institutional readiness and financing needs of different jurisdictions (NGFS, 2022a; IMF, 2023). A one-size-fits-all framework is neither feasible nor effective. Instead, regulatory strategies must strike a balance between financial risk mitigation and the proactive steering of capital toward sustainable sectors. The next section presents a comparative data-driven analysis of climate-related financial policies across these countries, identifying innovations, regulatory gaps and opportunities for aligning financial systems with an orderly and just climate transition.

Box 2. Regulatory innovations: lessons from the European Union, Brazil and China

European Union – Green taxonomy and supervisory integration
The European Union (EU) has taken the global lead in defining green finance standards via its Sustainable Finance Taxonomy. This legally binding classification system identifies environmentally sustainable activities, reducing market fragmentation and greenwashing. It is complemented by mandatory climate disclosures under the Corporate Sustainability Reporting Directive (CSRD) and integration of climate risk into ECB's supervisory stress testing and Pillar 2 review processes. By aligning capital markets, banks and institutional investors around common standards, the EU provides a full-spectrum model from taxonomy to supervision.

Key insight: Regulatory clarity drives market confidence, but legal enforcement and supervisory follow-through are essential for credibility

Brazil – Mandatory ESG disclosures and central bank alignment
Brazil's central bank (Banco Central do Brasil) has emerged as a leader among emerging markets by issuing mandatory climate and ESG disclosure requirements for all financial institutions. Since 2021, regulated entities must report climate-related financial risks and implement governance measures aligned with sustainability. Brazil also integrates ESG risk into credit risk assessments and has launched climate scenario analysis pilots with support from the NGFS.

Key insight: A clear mandate from financial supervisors – backed by political will – can institutionalise green-risk management even in developing contexts.

China – Green supporting factors and directed credit policies
China pioneered the use of green supporting factors in its macroprudential framework, applying lower risk weights to loans for certified green projects. The People's Bank of China (PBoC) and the China Banking Regulatory Commission (CBRC) have embedded these into prudential guidance, enabling targeted credit expansion for renewable energy, electric vehicles and clean tech. The country also maintains a Green Bond Endorsed Project Catalogue, facilitating alignment of bond issuance with industrial policy and climate goals.

Key insight: Targeted regulatory incentives, paired with clear sectoral priorities, can unlock capital for green development at scale.

2.3. Framework for cross-country data collection and the role of climate-related financial policies

As climate change accelerates, climate-related financial policies (CRFPs) have become central to efforts to realign financial systems with sustainability objectives. These policies serve a dual function. On the one hand, they enhance the financial sector's resilience to climate-related disruptions – both physical and transition risks – by adjusting capital requirements, governance structures and disclosure practices. On the other, they actively steer capital flows away from carbon-intensive activities and towards climate-resilient and green sectors, thus accelerating the transition to a low-carbon economy and supporting Article 2.1(c) of the Paris Agreement (Krogstrup & Oman, 2019; TCFD, 2018; D'Orazio & Popoyan, 2019).

Climate-related financial policies are increasingly seen as a form of preventive macroprudential regulation. As recent work has shown, financial institutions are not only exposed to climate risk through their portfolios but can also amplify systemic vulnerabilities through feedback loops (Bolton et al., 2020; BIS, 2021). Integrating climate risk into the financial regulatory framework allows policymakers to mitigate these feedback effects and reduce the probability of disorderly transitions or asset market dislocations. Instruments such as climate stress tests, green supporting or brown penalising factors, enhanced disclosures and green credit allocation rules are already being tested or implemented in many jurisdictions, particularly in high-income and emerging economies (NGFS, 2022a; ECB, 2020).

Building on this foundation, the next section of the study aims to assess the landscape of CRFPs across 40 strategically selected countries, spanning four groups with different development levels and financial system capacities: (1) top OECD economies, (2) LDCs, (3) SIDS and (4) key emerging markets. These groups present varied profiles of vulnerability to climate risks, financial market maturity and institutional readiness, making comparative analysis both challenging and essential for targeted policy recommendations.

To this end, the authors adopt the methodological framework developed by D'Orazio (2023a), which builds a global database of climate-related financial policies based on publicly available data. The approach consists of three stages: defining a taxonomy of policy instruments, systematically collecting data from authoritative sources and coding the information based on content and institutional characteristics.

2.3.1. Methodology for data collection

The data collection relies on an extended version of the methodology introduced by D'Orazio and colleagues, structured to reflect the logic of the three pillars of the Basel III framework:

- **Pillar 1: Green prudential regulation (GPP)**

  These policies include capital and liquidity requirements, risk weights and large exposure rules that account for climate-related financial risks. Measures such as climate risk-adjusted capital buffers or climate-aligned leverage ratios fall into this category. Examples include stress testing, climate risk integration into the IRB approach or differentiated risk weights for green/brown assets (BCBS, 2011; D'Orazio, 2023a).

- **Pillar 2: Supervisory tools and risk management**

  This covers supervisory expectations related to governance, internal risk assessments and forward-looking analysis. Instruments such as climate scenario analysis, Internal Capital Adequacy Assessment Processes (ICAAP) and supervisory reviews are included. The aim here is to assess institutional readiness and the resilience of financial institutions to climate shocks (ECB, 2020; IMF, 2023).

- **Pillar 3: Disclosure and transparency**

  These include mandatory and voluntary climate-related disclosures that promote market discipline and investor awareness. Policy instruments under this pillar draw heavily from frameworks like the TCFD and cover disclosure rules for banks, insurers, pension funds and public companies (TCFD, 2018; Boermans & Galema, 2019).

To evaluate how different countries manage climate-related financial risks and steer capital toward sustainable sectors, the authors of this report adopt a structured methodology inspired by D'Orazio (2023a). The methodology reflects the taxonomy of climate-related financial policies developed in the recent literature (Krogstrup & Oman, 2019; D'Orazio & Popoyan, 2019), while aligning with the institutional logic of the Basel III framework, which governs much of global financial regulation.

This approach classifies policies into five key policy tools; each reflecting different regulatory strategies to manage climate risks and support green finance. These are then aligned with the three Basel III Pillars – minimum capital requirements (Pillar 1), supervisory review (Pillar 2) and disclosure (Pillar 3).

The authors of this study and report summarise these five policy areas in **Table 2** below.

Table 2: Five policy areas for green financial regulations

Policy tool	Description	Objectives	Key instruments	Typical authorities	Basel III pillar alignment
Green prudential regulations (GPP)	Policies aimed at integrating climate risks into prudential regulation of financial institutions	Safeguard financial stability in the face of physical and transition risks	Climate-adjusted capital requirements, stress testing, risk weights, liquidity requirements, large exposure limits, governance rules	Central banks, financial supervisors	**Pillar 1** (capital and liquidity), **Pillar 2** (risk management)
Green credit allocation policies (GCA)	Policies that direct credit and lending toward low-carbon or sustainable sectors	Channel credit toward priority green sectors and mitigate credit constraints in green transition	Green lending quotas, interest subsidies, concessional loans, sectoral credit ceilings	Ministries of finance, central banks, development banks	Indirectly supports **Pillar 1** through credit exposure influence
Green financial guidelines (GFG)	Guidelines and taxonomies to create an enabling environment for sustainable finance markets	Define what constitutes 'green' investment and support consistent financial practices	Green finance principles, sustainable finance taxonomies, voluntary guidelines	Ministries of environment / finance, central banks, cross-sector working groups	Supports **Pillar 2** (supervisory expectations) and **Pillar 3** (market discipline)
Other green disclosure requirements (OGD)	ESG and climate disclosure mandates for non-bank financial institutions and corporates	Improve transparency, reduce greenwashing, align investor expectations	ESG reporting rules, climate-related risk disclosure for pension funds, insurers, corporates	Financial regulators, securities commissions	**Pillar 3** (transparency and market discipline)
Green bonds (GB)	Regulations and initiatives that support issuance and verification of green bonds	Mobilise capital for climate mitigation and adaptation projects	Green bond standards, tax incentives, reporting frameworks, labelling schemes	Governments, stock exchanges, central banks	Indirectly supports Pillar 1 and **Pillar 3** through risk alignment and transparency

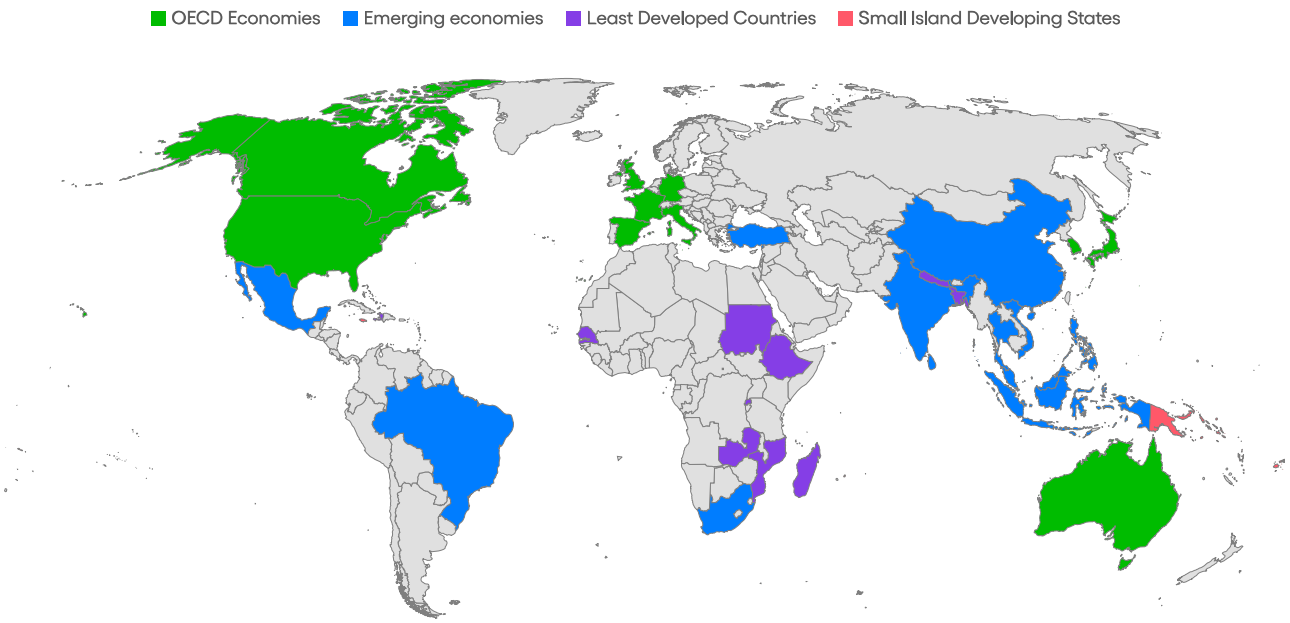
Source: Authors' elaboration

These policy areas serve different functions within the regulatory ecosystem. While green prudential regulations and green credit allocation policies address risk exposure and credit flow channels directly, green financial guidelines, other green disclosure requirements and green bonds create the institutional and market infrastructure to promote sustainable finance, improve transparency and foster investor confidence.

2.3.2. Scope of the analysis: country groupings and comparative framework

This section provides a data-driven analysis of climate-related financial policies (CRFPs) implemented across 40 countries grouped into four key blocs: OECD countries, LDCs, SIDS and emerging economies with stronger credit profiles. Drawing from the dataset and guided by the taxonomy developed in D'Orazio (2023a), we analyse the distribution, institutional characteristics and regulatory bindingness of CRFPs. **Figures 2–5** collectively provide a comprehensive overview of where and how these policies are being implemented.

Figure 2: The distribution of countries involved in the dataset

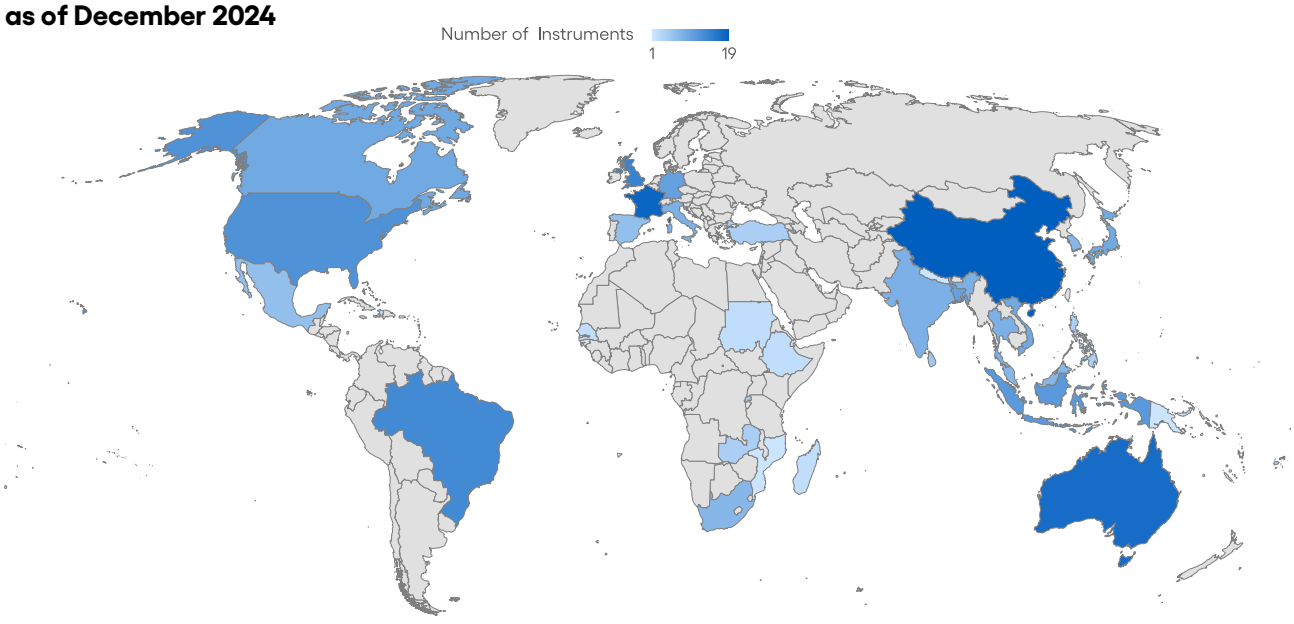


Source: Authors' elaboration

2.3.3. Spatial and quantitative coverage: concentration in advanced economies

Figure 2 illustrates the geographic spread of countries included in the study, representing a balanced distribution across income levels and regions. However, as **Figure 3** demonstrates, there is a pronounced concentration of policy activity in advanced economies. China, France, Australia and the United Kingdom lead in the number of climate-related financial policies adopted, with China implementing 19 distinct measures, closely followed by France (18), Australia (17) and the UK (14). These countries benefit from mature regulatory environments, strong institutional capacity and active participation in global financial governance platforms such as the NGFS and the Financial Stability Board. This dynamic reflects not only their high exposure to transition risks but also their proactive role in shaping the global climate finance agenda (NGFS, 2022b; ECB, 2020).

Figure 3: Spatial coverage of the database and the total number of policies adopted by each country as of December 2024



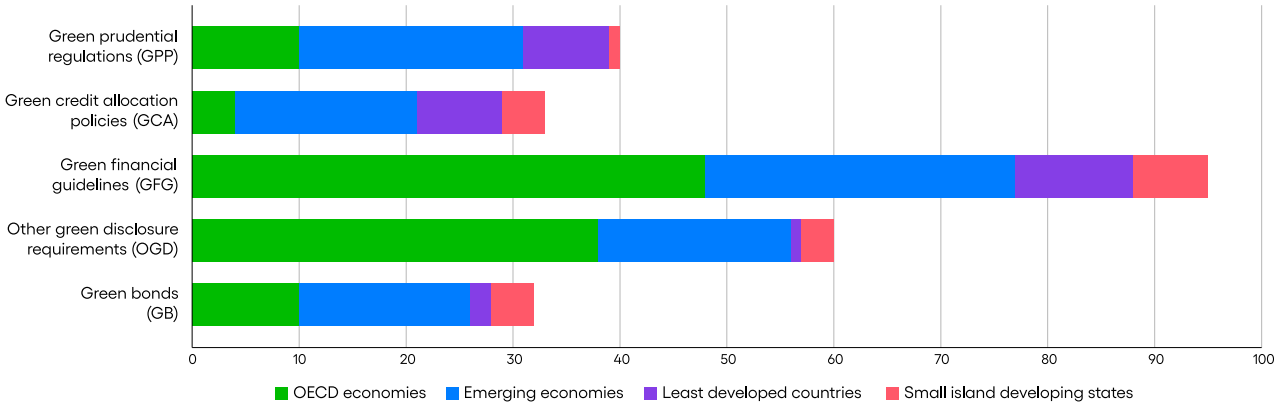
Source: Authors' elaboration

In contrast, many LDCs and SIDS exhibit significantly lower policy adoption rates. This gap is often due to constrained fiscal space, limited supervisory capacity and dependence on external funding mechanisms. These jurisdictions typically lack the institutional depth required to implement complex prudential frameworks or enforce binding climate disclosure mandates (IMF, 2021). The uneven distribution in **Figure 3** raises important questions about the global equity of regulatory transitions and the potential risk of regulatory fragmentation.

2.3.4. Distribution by policy tool and development level

Figure 4 presents the distribution of climate-related financial policies by policy tool (CAT2) and development level. High-income countries (HICs) exhibit strong engagement across all five policy areas, with a clear emphasis on Green Prudential Regulations (GPP), Green Financial Guidelines (GFG), and Other Green Disclosure Requirements (OGD). These tools align with Basel III Pillars 1 and 3 and reflect the institutional capacity of advanced economies to embed climate considerations into capital requirements, supervisory expectations and market transparency.

Figure 4: Measures sorted by policy tools adopted by different groups of countries



Source: Authors' elaboration

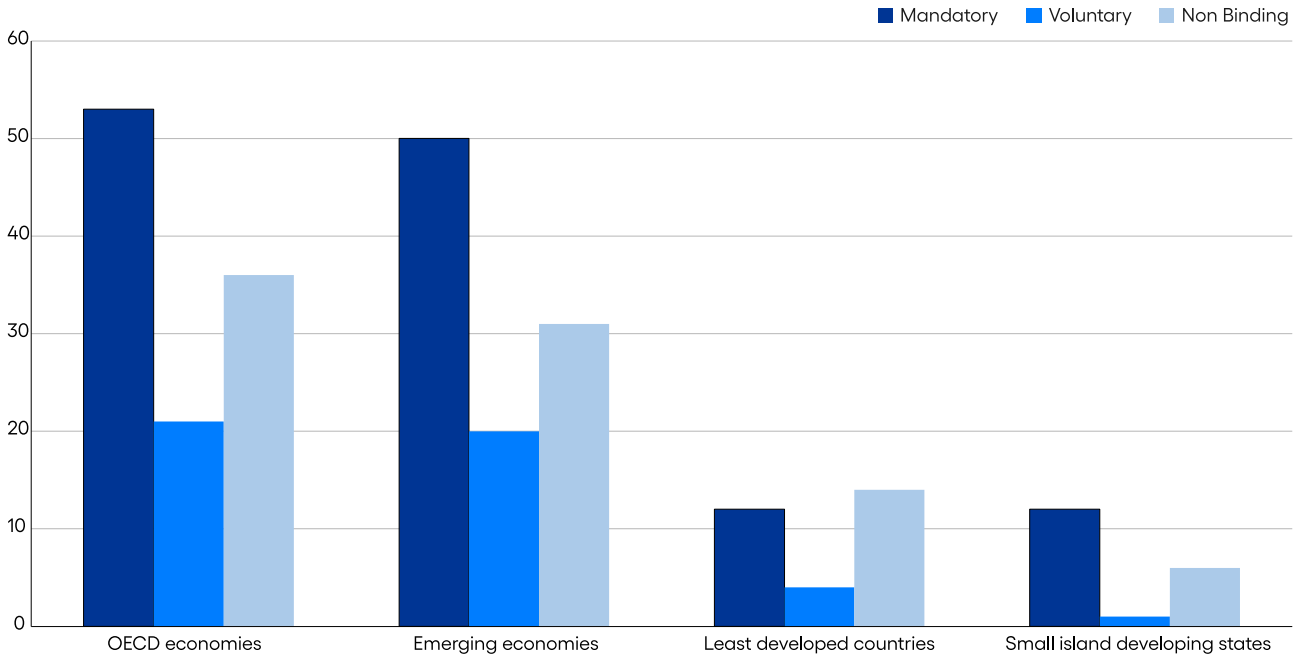
Upper-middle-income countries (UMICs), such as China, Brazil and South Africa, are also active in implementing GFGs and GPPs, with some progress in GB frameworks. This reflects their ambition to attract green capital and integrate into sustainable financial markets. Conversely, lower-middle-income countries (LMICs) and LDCs show a skewed distribution. While LMICs have made notable strides in adopting green bonds and basic prudential rules, LDCs display limited engagement across most categories. The most commonly adopted tools in LDCs pertain to green prudential measures, likely due to international support and technical assistance from multilateral institutions.

This distribution supports the view that while green financial taxonomies and disclosure norms have become widespread in developed markets, capital-constrained economies tend to rely more heavily on externally financed or donor-supported instruments like green bonds (UNEP FI & Oliver Wyman, 2022).

2.3.5. Bindingness of climate-related financial policies

Figure 5 reveals the distribution of policy bindingness. Out of 260 recorded policies, approximately 43% are mandatory, 14% are voluntary and the remaining 42% are either not binding or lack bindingness information. These findings highlight two important trends. First, there is growing momentum toward legally enforceable climate-related financial measures, particularly in Europe and Asia, demonstrating a shift from voluntary guidance toward rule-based regulation (ECB, 2021; BIS, 2021). Second, the significant share of non-binding policies reflects the early stage of regulatory integration in many countries, especially in the Global South, where pilot frameworks and soft-law instruments dominate the landscape.

Figure 5: Distribution of policy adoption by bindingness

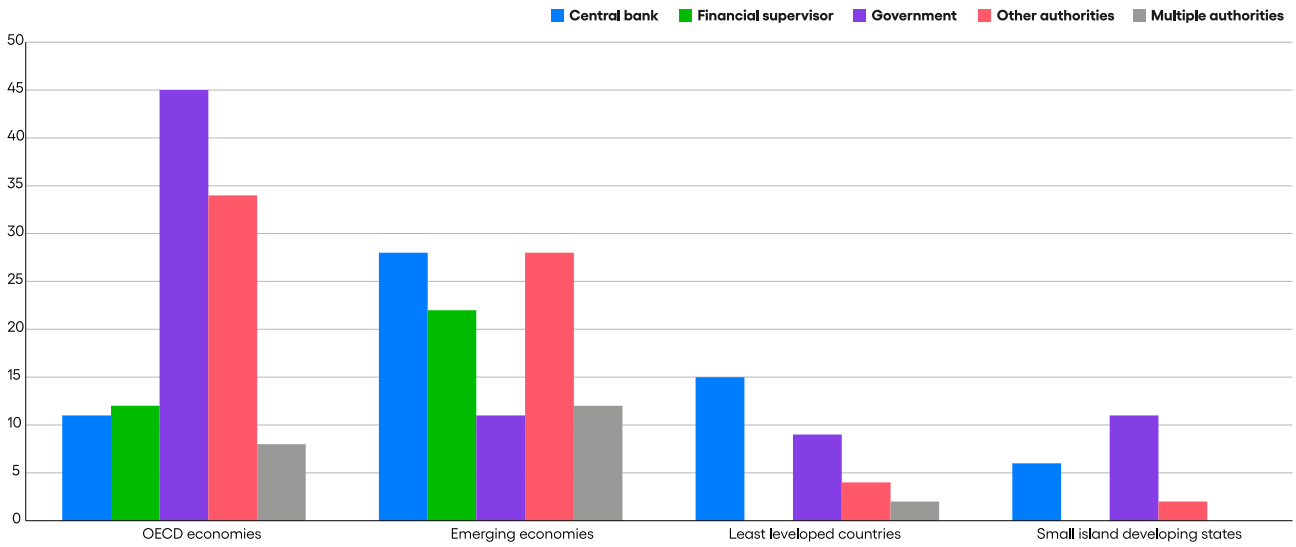


Source: Authors' elaboration

Voluntary and non-binding policies can serve as critical entry points, helping build institutional capacity and stakeholder buy-in. However, without progression toward mandatory rules – especially for disclosures, capital treatment of green assets and supervisory assessments – such policies risk being ineffective in correcting misaligned capital flows or mitigating systemic climate risks (TCFD, 2018; Battiston et al., 2017).

The analysis of **Figures 2-5** reveals both progress and gaps in the adoption of climate-related financial policies. While high-income and some emerging economies are leading the way, LDCs and SIDS remain underrepresented in the policy landscape. The distribution by policy type and authority shows a heavy reliance on non-binding instruments and government-led initiatives, particularly in countries with weaker financial institutions. These patterns underscore the importance of targeted capacity-building, regulatory harmonisation and international support mechanisms to ensure that all countries can benefit from climate-aligned macroprudential policy frameworks.

Figure 6: Distribution of policy adoption by authority responsible for the policy's formulation/ promotion

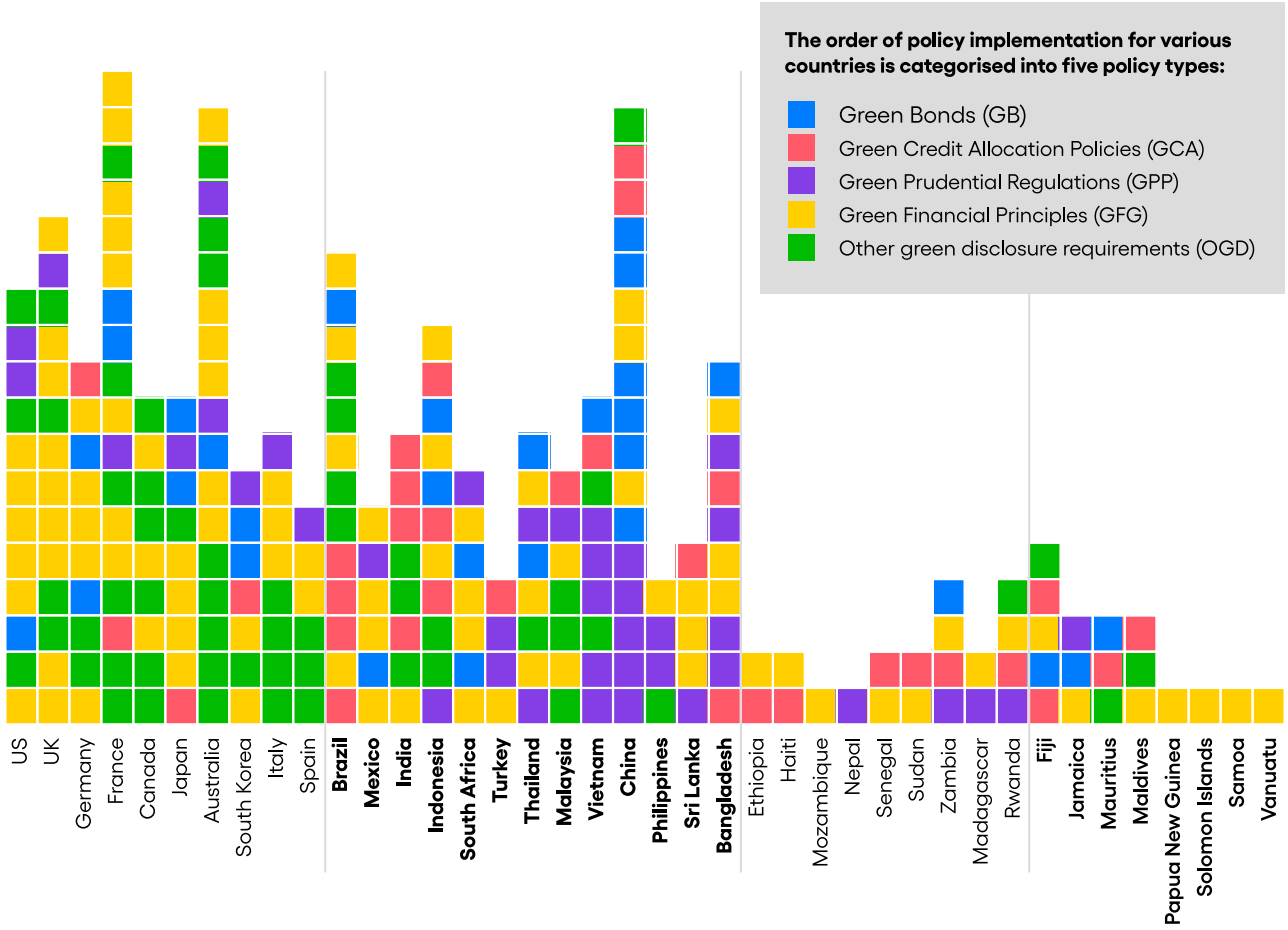


Source: Authors' elaboration

Figure 6 presents the distribution of climate-related financial policies according to the authority responsible for their formulation or promotion. Central banks and financial supervisors emerge as the leading authorities, responsible for implementing most climate-related financial regulations, followed by government ministries and cross-sector working groups. This distribution underscores the critical role of monetary and financial supervisory bodies in integrating climate risks into macroprudential frameworks. The dominance of central banks aligns with global initiatives like the NGFS, emphasising central banks' pivotal role in embedding sustainability into financial stability objectives. However, the significant involvement of government ministries, particularly in developing countries, highlights the importance of broader inter-agency coordination and underscores the necessity of aligning regulatory initiatives with fiscal and environmental policies to achieve comprehensive sustainable finance strategies.

Figure 7 illustrates the sequence of policy implementation across the selected countries, categorised into five distinct policy types: GB, GCA, GPP, GFG and OGD. The observed sequences reveal distinct pathways and priorities that countries adopt depending on their financial system maturity and institutional capabilities. Developed and key emerging economies tend to initiate their climate financial policies with GFG, laying foundational standards and taxonomies to guide market behaviour before moving to more complex regulatory instruments such as prudential regulations (GPP) and bond markets (GB). In contrast, LDCs and SIDS often prioritise GB and GCA policies initially, largely driven by immediate funding needs for climate-resilient infrastructure and adaptation measures, frequently supported by international donor mechanisms. This sequencing underscores the necessity for capacity-building efforts to enable these countries to transition progressively towards comprehensive prudential frameworks.

Figure 7: Policy implementation sequences across countries



Source: Authors' elaboration

The challenges mentioned above are also echoed in the primary survey results (see Section 3.5), where data fragmentation and taxonomy inconsistencies were cited as the most recurrent obstacles to integrating climate risk into financial decision-making.

Box 3. Preparing for recommendations

The analysis above underscores critical gaps in current macroprudential frameworks, particularly their insufficient integration of climate-related financial risks. To address these shortcomings, the policy recommendations will focus on:

- Practical modifications to Basel III standards to explicitly integrate climate risk assessments.
- Introduction and cautious calibration of green supporting and brown penalising factors in prudential regulations.
- Enhancing supervisory practices (such as climate stress tests) to mitigate financial stability risks and improve capital allocation.
- Strengthening transparency and market discipline through mandatory climate-related disclosures aligned with international standards like the TCFD.

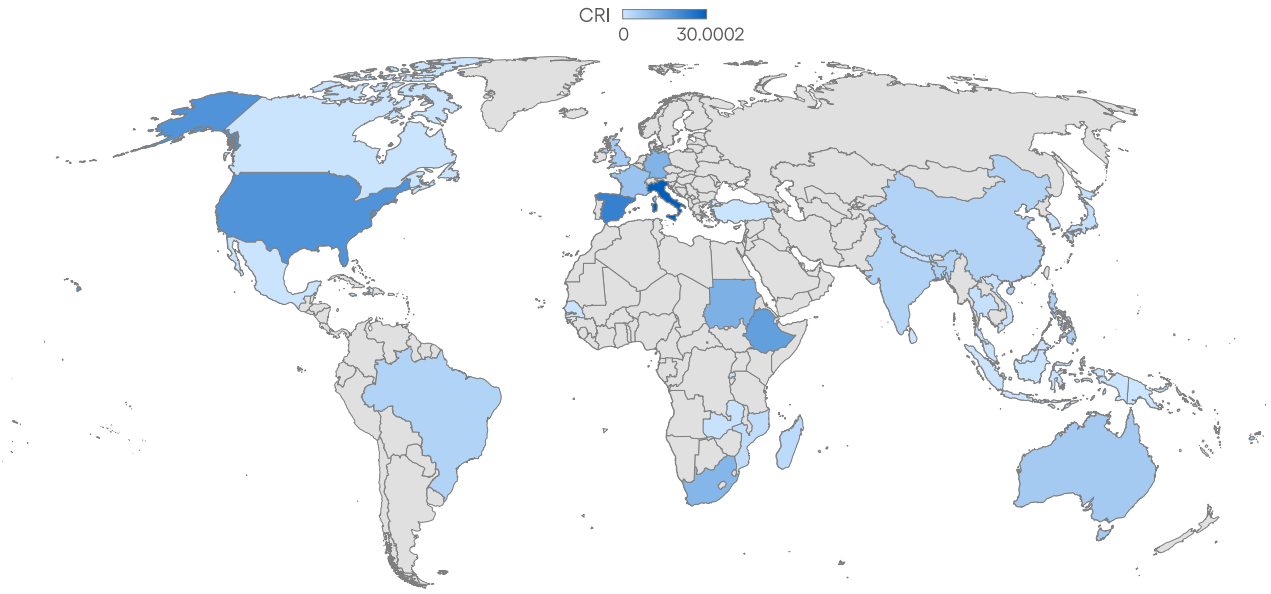
3. Current investment climate and regulatory challenges

This section turns to the investment realities on the ground, analysing the alignment – or misalignment – between climate finance flows, regulatory regimes and actual climate vulnerability across different country groupings. While previous sections focused on the transmission of climate-related financial risks and the diffusion of climate-related financial policies, this section provides a deeper look at the structural and institutional conditions that shape the effectiveness of green macroprudential regulation. Drawing on emissions data, climate vulnerability indices and climate-related official development assistance (ODA) flows, it highlights stark disparities in who receives climate finance and under what terms. The analysis also explores how global financial regulations – particularly risk-weighting practices under Basel III – contribute to investment bottlenecks in EMDEs. In doing so, this section underscores the need for regulatory frameworks that better reflect the climate risk exposure and financing needs of vulnerable economies, setting the stage for the policy recommendations that follow.

3.1. Emissions and climate vulnerability: contrasting profiles

Data depicted in **Figures 8 and 9** underscore the stark disparity in GHG emissions versus climate vulnerability among four country groupings –SIDS, LDCs, emerging economies and OECD countries. The OECD and large emerging economies produce the vast majority of global emissions, whereas SIDS and LDCs contribute only a negligible share. For example, SIDS collectively emit <1% of global CO_2 (UNCTAD, 2024) and the 46 LDCs together account for only about 3.3% of global GHG emissions (UNDP, 2023). In contrast, OECD nations and major emerging economies (like China, India, Brazil) are among the largest emitters in absolute terms. On a per-capita basis, **Figure 9** shows OECD countries far ahead of the other groups in emissions, with emerging economies catching up, while both LDCs and SIDS remain minimal emitters.

Figure 8: Climate Risk Index for the selected countries

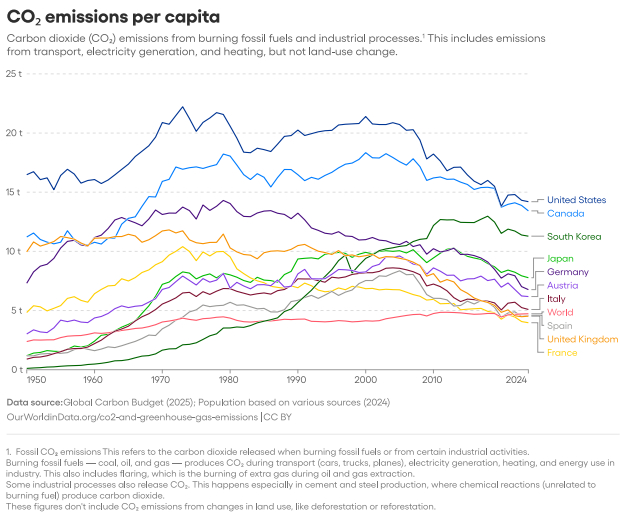


Source: Authors' elaboration based on the GermanWatch data

Yet those who emit the least are the most vulnerable to climate impacts. According to vulnerability indices (e.g., the Germanwatch Climate Risk Index cited in **Figure 8**), SIDS and LDCs consistently rank among the countries most at risk from climate change. They experience disproportionately severe impacts – from extreme weather to sea-level rise – relative to their size and emissions. In fact, developing countries (especially SIDS and LDCs) suffer far more from climate extremes than industrialised nations, when considering impacts on GDP, lives and livelihoods. LDCs and SIDS face "immense challenges" in preventing and recovering from climate shocks, and tragically over two-thirds of deaths from climate-related disasters occur in LDCs (UNDP, 2023). Meanwhile, most OECD economies, with greater adaptive capacity and resources, have much lower relative vulnerability. This inverse relationship – low emitters often being high in vulnerability – highlights a fundamental climate justice concern.

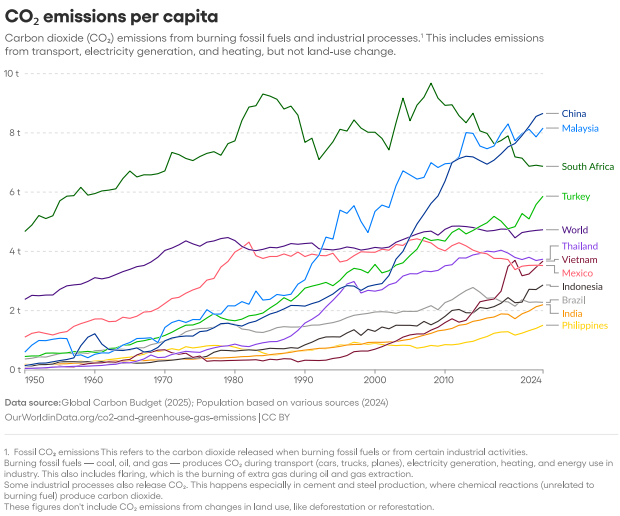
Figure 9: Emissions per capita for OECD, emerging economies, SIDS and LDCs

a) Emissions per capita for selected OECD countries



1. Fossil CO_2 emissions This refers to the carbon dioxide released when burning fossil fuels or from certain industrial activities. Burning fossil fuels — coal, oil, and gas — produces CO_2 during transport (cars, trucks, planes), electricity generation, heating, and energy use in industry. This also includes flaring, which is the burning of extra gas during oil and gas extraction. Some industrial processes also release CO_2. This happens especially in cement and steel production, where chemical reactions (unrelated to burning fuel) produce carbon dioxide. These figures don't include CO_2 emissions from changes in land use, like deforestation or reforestation.

b) Emissions per capita for selected emerging economies



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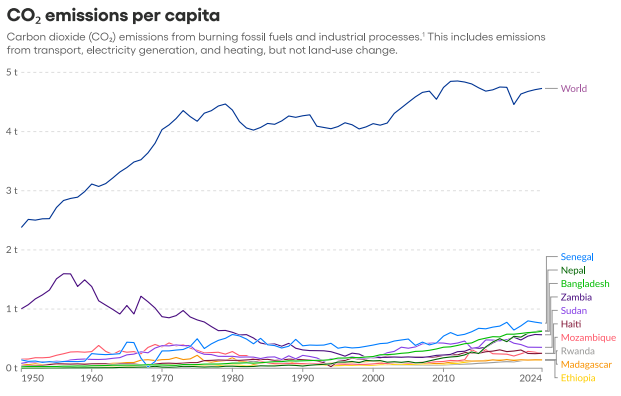
c) Emissions per capita for selected LDCs



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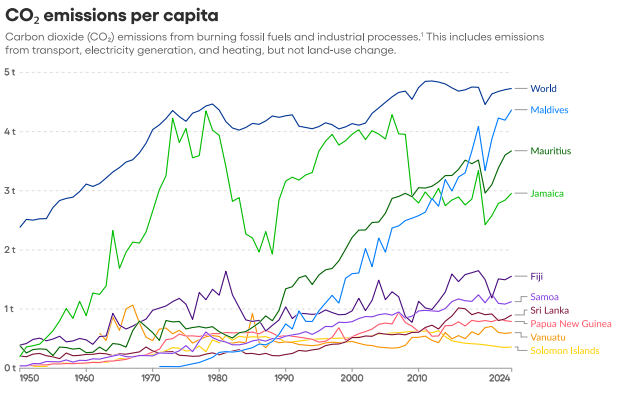
d) Emissions per capita for selected SIDS



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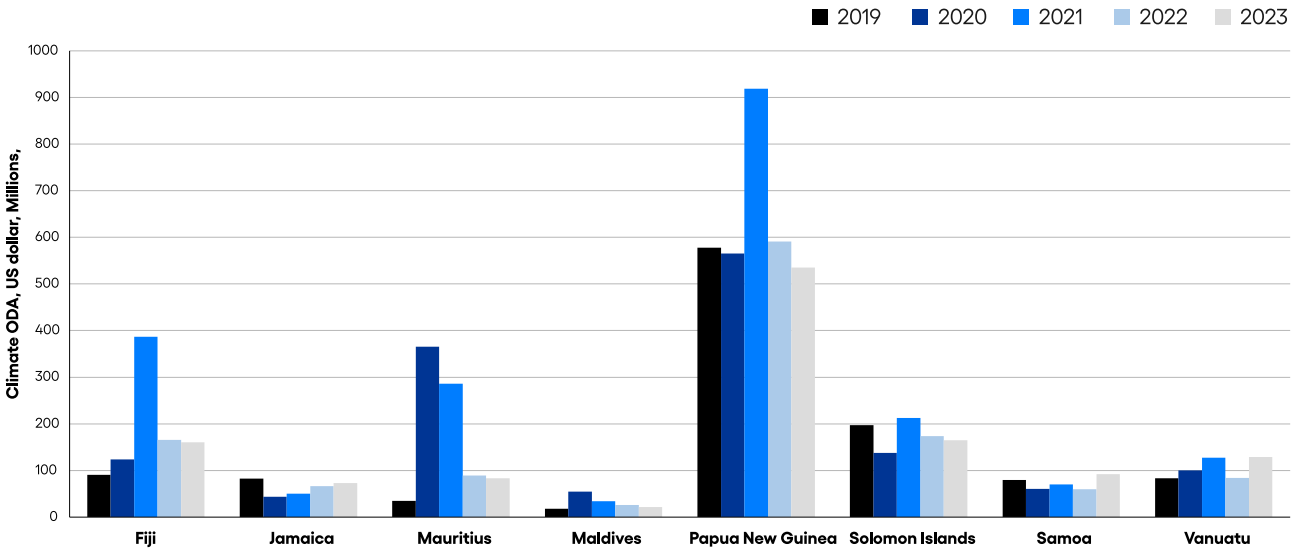
Source: Authors' calculation based on data provided by Our World in Data

Figure 10: Official development assistance for climate finance to selected SIDS



Source: Authors' elaboration based on OECD (2025) CRS database

Box 4. Summary of key insights and policy implications

- Despite negligible emissions, SIDS and LDCs suffer disproportionately severe impacts from climate change, highlighting acute climate injustice.
- OECD and major emerging economies contribute significantly more to global emissions but have better adaptive capacity.

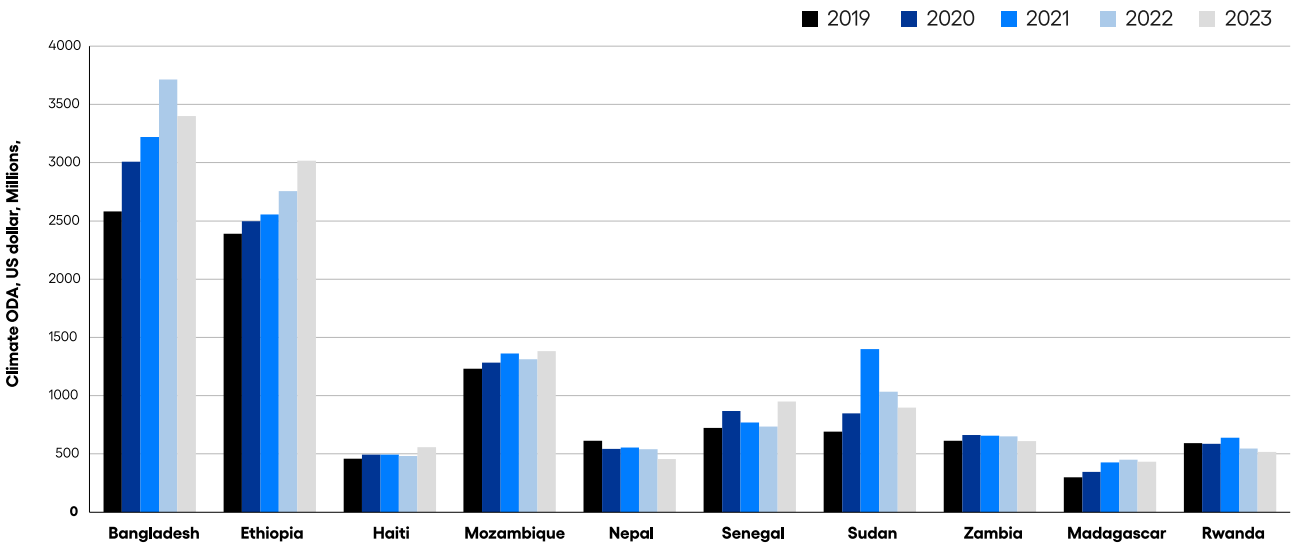
Policy recommendations:

Climate finance flows should prioritise adaptation and resilience projects in highly vulnerable regions (SIDS, LDCs), using vulnerability indices explicitly in funding decisions. International financial institutions and regulators should explicitly integrate climate vulnerability measures into financial risk assessments and regulatory frameworks, enhancing incentives for resilience investments in low-emitting but vulnerable countries.

3.2. Climate ODA allocation: patterns vs. needs

Ideally, climate-related ODA and finance flows should target those countries that are most vulnerable and least responsible for emissions. However, **Figures 10–12** (drawing on OECD's CRS database) reveal misalignments in climate finance allocation. Climate ODA flows to SIDS and LDCs, while increasing in the past decade, remain modest and incommensurate with their vulnerability. Notably, recent data shows a troubling reversal: in 2022, climate-related ODA to SIDS actually declined by 23%, down to just US$1.5 billion, even as global ODA hit a record high (UNDP, 2023). This downturn (also noted by OECD analyses) suggests that international support for SIDS is faltering at a time when cascading climate crises demand more aid, not less. We cite OECD findings warning that flows from international climate funds to SIDS "may decline in the near future", reflecting a prevailing bias that undervalues countries with low total emissions. In other words, because SIDS do not significantly reduce global emissions, donors may be deprioritising them – a bias that neglects their urgent adaptation needs.

Figure 11: Official development assistance for climate finance to selected LDCs



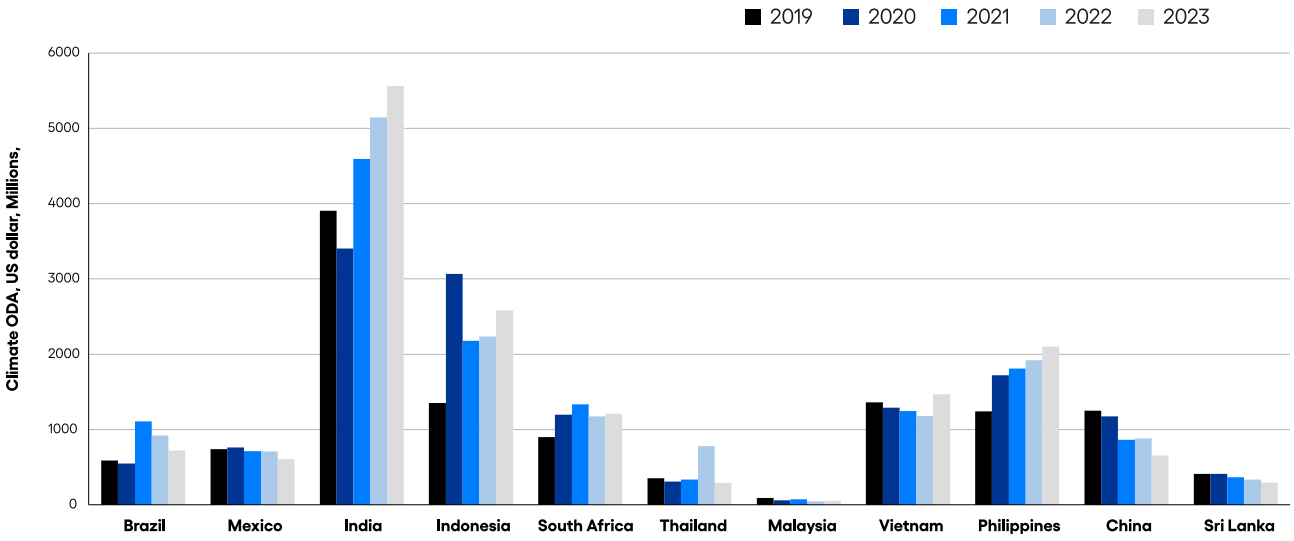
Source: Authors' elaboration based on OECD (2025) CRS database

A similar disparity is seen with LDCs. LDCs depend heavily on international climate finance for adaptation, yet they struggle to secure adequate funding. Over a decade ago, developed countries pledged US$100 billion per year by 2020 for climate action in developing nations, but this pledge remains unmet. Most climate finance available is still skewed toward mitigation projects in larger emerging economies, rather than adaptation in vulnerable LDCs. In fact, an estimated 90% of climate finance currently goes to mitigation even though the greatest needs in LDCs are for adaptation, leading to a massive adaptation finance gap (5-10× current flows). This means high-vulnerability, low-emission countries are not receiving finance proportional to their climate risks.

Figures 11 and 12 illustrate that even within SIDS and LDC groupings, many highly climate-vulnerable nations receive relatively little climate aid, especially for adaptation. Meanwhile, some larger emerging economies – though less vulnerable on average – attract significant climate finance (often in the form of loans or private investments) for mitigation projects like renewable energy. This pattern contradicts the principle of aligning finance with climate vulnerability: money tends to flow where emissions can be cut at scale, rather than where climate impacts are most acute.

Key discrepancies emerge from these patterns. For instance, a small island state facing existential threats from sea-level rise might receive only a fraction of the climate funding that a bigger emerging economy gets for green energy projects. This emphasises that SIDS "require particular international support" due to their vulnerability, yet current flows do not reflect this imperative. In the data, we see that highly vulnerable, low-emitting countries often receive lower climate aid per need – a misallocation that leaves critical adaptation projects underfunded. Indeed, despite accounting for a trivial share of emissions, SIDS and LDCs are on the front lines of climate change with limited resources of their own. The real-world consequence of this finance gap is evident: for example, in the Caribbean alone, climate-related damages are estimated at US$12.6 billion per year, far outpacing the aid received. Such gaps underscore a disconnect between climate vulnerability and the actual allocation of climate finance.

Figure 12: Official development assistance for climate finance to selected emerging economies



Source: Authors' elaboration based on OECD (2025) CRS database

Box 5. Summary of key insights and policy implications

- Climate ODA flows are significantly misaligned with actual climate vulnerability, favouring larger emerging economies' mitigation projects over urgently needed adaptation in SIDS and LDCs.
- Recent declines in climate ODA to highly vulnerable countries reflect systemic underfunding.

Policy recommendations:

1. International climate finance mechanisms should establish minimum allocation targets specifically for adaptation finance in SIDS and LDCs, safeguarding against shifting donor priorities.
2. Multilateral development banks and donors should use simplified application processes and capacity-building support to improve access and effectiveness of climate funding for vulnerable economies.

3.3. Structural barriers to accessing climate finance

One reason for these discrepancies lies in structural barriers that impede vulnerable countries' access to climate finance, as highlighted in the 2023 OECD report on climate capacity in SIDS. Many SIDS and LDCs lack the institutional and technical capacity to navigate the complex architecture of international climate funds. According to the OECD, limited financial and human resources in SIDS are a primary constraint, affecting their ability to design bankable projects and meet fund requirements (OECD, 2023). Many climate funding mechanisms demand detailed proposals, robust data and co-financing arrangements – burdensome requirements that small states with stretched administrative capacity struggle to fulfil. As a result, SIDS often end up pursuing only short-term, small-scale climate projects that fit their capacity, rather than the large transformative projects they truly need. This capacity gap is a structural issue: even when money is theoretically available, it may not reach SIDS/LDCs because they face hurdles in accessing it. The OECD report stresses that SIDS "need more capacity to access climate finance and transform their economies" and calls for targeted support to overcome these barriers (OECD, 2023). Without concerted efforts to strengthen local capacities – through technical assistance, simplified application processes and project preparation support – the most vulnerable countries remain effectively locked out of substantial climate funding, perpetuating the cycle of underinvestment in resilience.

Another structural challenge is the lack of alignment in global financial regulations and investment incentives with climate vulnerability and sustainability goals. The report points to macroprudential regulatory frameworks as a root cause of poor investment flows to developing economies. Current financial regulations – largely designed for stability and risk management – can unintentionally penalise climate-vulnerable countries. For example, under the Basel III rules, banks must assign higher risk weights to what are deemed riskier assets. Many LDCs and SIDS, due to lower credit ratings and perceived political/market instability, are tagged with very high-risk weights (often 100-150% for their sovereign debt), compared to 0% risk weight on OECD sovereign bonds. This means a bank must hold substantially more capital to lend in, say, Mozambique or Vanuatu, than to lend in the US or Europe – driving up the cost of capital and deterring investment in those vulnerable countries. Such one-size-fits-all risk metrics do not account for climate vulnerability or the urgent need for green investment in developing economies. Climate risks themselves are not adequately integrated into these frameworks: financial regulators have only just begun to consider how climate change alters credit risk, and in the meantime the system systematically underpriced the long-term risks of inaction while over-penalising countries already deemed risky. The outcome is a misallocation of capital – with banks and investors avoiding poorer climate-vulnerable nations, thus reinforcing a scarcity of investment for adaptation and low-carbon development there.

The absence of widespread "green macroprudential" policies exacerbate this problem. Green macroprudential policies refer to regulatory tools that explicitly incorporate climate considerations – for instance, adjusting bank capital requirements to favour green investments or to recognise the reduced default risk of climate-resilient projects. A few pioneering jurisdictions have experimented with such measures: the report notes China's use of differentiated risk weights (a form of green supporting factor) to boost renewable energy investment, which has shown success in mobilising private capital for sustainable infrastructure. However, by and large, most countries (and international standards) have not adopted these adaptive measures. **Figures 4-7** indicate that advanced economies are leading in climate-related financial policy adoption, whereas LDCs and SIDS lag far behind due to limited capacity and resources. This gap in climate-financial regulatory readiness means that in vulnerable countries, banks and markets operate without incentives or mandates to drive green investment. And internationally, the lack of alignment – no recognition of

climate vulnerability in risk assessments, no reward for sustainable lending – means capital continues to flow based on traditional risk-return logic, which disfavours poorer, risk-marked countries. In short, the global financial rulebook has not been updated to reflect the realities of climate risk. Beyond the regulatory design itself, the capital cost barrier is among the most tangible constraints for financial institutions operating in EMDEs. Consultations with banks and regulators reveal that even when green projects demonstrate strong fundamentals, high capital charges and limited recognition of risk mitigation instruments, such as partial guarantees or multilateral credit enhancements, discourage participation. These factors compound the already narrow lending margins in developing markets and create a structural bias against long-term, climate-resilient investment.

This misalignment is a fundamental structural issue underpinning the poor investment flows to climate-vulnerable economies. To summarise the contrasts across these four country groupings, **Table 3** provides a comparative overview of their emissions, climate vulnerability, climate-related ODA receipts and the state of climate-focused financial regulation:

Table 3: Comparative matrix of emissions, climate vulnerability, climate-related ODA receipts and the state of climate-focused financial regulation of selected OECD countries, emerging economies, SIDS and LDCs

Country group	Emissions contribution	Climate vulnerability	Climate ODA inflows	Climate-finance regulatory readiness
SIDS	**Negligible emissions** • Collectively **<1%** of global CO_2 • Very low per capita	**Extremely high vulnerability** • Face severe climate impacts (storms, sea-level rise) with limited adaptive capacity • Among top-risk countries on the Climate Risk Index	**Limited and declining** • Received ~ US$1.5 billion in climate ODA in 2022 (a **23% drop** from 2021) • Support is **insufficient** relative to needs (e.g., damages worth >US$12 billion/year in the Caribbean)	**Low** • Very few climate-related financial policies adopted due to capacity • Reliant on external support • Underrepresented in green finance initiatives
LDCs	**Minimal share** of emissions • **≈3%** of global GHG • Low per capita emissions	**Critically high vulnerability** • Highly exposed to climate shocks (droughts, floods) • **Low resilience** leads to high impacts (over two-thirds of global climate disaster deaths occur in LDCs)	**Moderate but inadequate** • Climate ODA and grants are a major funding source for LDCs but needs far outstrip flows • Adaptation finance gap is 5–10× current flows • Much of promised climate finance (US$100 billion/year) still unmet	**Low** • Very limited implementation of climate-focused financial regulations • Some basic green prudential measures with donor, but overall regulatory capacity is weak

Country group	Emissions contribution	Climate vulnerability	Climate ODA inflows	Climate-finance regulatory readiness
Emerging economies	**High and growing emissions** • Major contributors (e.g., China, India, South Africa) to current global emissions • Many emerging economies are among the top CO_2 • Per capita emissions vary but are rising	**Mixed vulnerability** • Some emerging economies (e.g., large middle-income countries) have moderate vulnerability and stronger coping capacity, though others (small or climate-exposed emerging states) still face high risks • Overall, less vulnerable than LDCs/SIDS, but not immune to climate impacts	**Significant in absolute terms**, but mainly via market finance and loans rather than grants • Attract substantial climate finance for mitigation (renewables, etc.), often through multilateral development banks (MDBs) and private investment • However, poorer emerging nations still struggle to access affordable green finance	**Medium** • Improving climate-financial policy framework • Several have implemented green financial guidelines, taxonomies, and some prudential tweaks (China, Brazil, etc. are leaders) • However, across emerging markets, regulatory quality varies • Stronger in upper-middle-income states, weaker in lower-income ones
OECD countries	**Very high emissions** • Historically dominant emitters with high per capita CO_2 • Collectively account for a large share of cumulative emissions and still a significant portion of annual emissions	**Lower vulnerability** • Generally more resilient due to wealth and infrastructure • Face climate events but with far less relative impact on lives and GDP • Some exceptions exist, but overall adaptive capacity is high.	**Negligible as recipients** • Typically donors, not recipients, of climate ODA • Instead, they mobilise domestic resources for climate action and contribute to international climate finance	**High** • Advanced climate financial regulation in place • Many OECD jurisdictions have robust green finance policies (e.g., mandatory climate disclosures, green taxonomies, central bank climate stress tests) • Leading in adopting green macroprudential measures, though full alignment of financial regulation with climate goals is still ongoing

Source: Authors' elaboration

While regulatory barriers in EMDEs are a major hurdle, the perspective of private capital providers – such as institutional investors, MDBs and impact funds – adds another critical dimension. These actors often cite weak credit environments, limited pipelines of investable projects and high transaction costs as major deterrents to green investment in EMDEs (OECD, 2021). Risk-return expectations are central: without credit enhancements or guarantees, sustainable investments in low-income countries are often seen as non-competitive, despite their high climate impact potential.

Blended finance mechanisms – such as first-loss tranches, political risk insurance and concessional anchor investments – can play a transformative role by shifting the risk profile of green projects. MDBs and development finance institutions (DFIs) have piloted such instruments to crowd in private capital, with notable success in infrastructure and renewable energy sectors. However, uptake remains limited and insufficiently tailored to climate resilience needs in the most vulnerable regions, especially in SIDS and LDCs.

Moreover, the absence of clear and globally harmonised taxonomies, standards and climate disclosure practices adds to investor uncertainty. Financial institutions are increasingly seeking alignment with frameworks such as the EU Taxonomy and TCFD, yet most EMDEs lack equivalent structures, leading to inconsistency in project labelling and valuation. This mismatch complicates cross-border investment strategies and limits the scalability of climate finance solutions.

Addressing these investor-side constraints is essential to unlocking private capital for green and resilient infrastructure in developing regions. Scaling up de-risking instruments, strengthening public-private co-financing models and expanding capacity-building support for project structuring are key policy levers to complement macroprudential reforms. Without integrating investor risk perceptions into the policy design, macroprudential adjustments alone may not be sufficient to redirect capital flows. Green finance architecture must include both supply- and demand-side de-risking strategies to align financial stability with climate objectives.

Table 4: Investor Constraints – Solutions – Key Actors Framework

Investor constraint	Policy or market solution	Key actor
High perceived credit and political risk	Blended finance (e.g., first-loss guarantees, political risk insurance)	MDBs (e.g., IFC, ADB), Development finance institutions, national development banks
Lack of bankable, investable green projects	Project preparation facilities, technical assistance, standardisation of project criteria	Green Climate Fund (GCF), Global Infrastructure Facility (GIF), donor agencies
Unclear or non-existent green taxonomies and disclosure standards	Development of local taxonomies aligned with global frameworks (e.g., EU Taxonomy, TCFD)	Ministries of finance, central banks, NGFS, ISSB, UNEP FI
Unattractive risk-return profile of long-term green projects	Credit enhancement mechanisms, concessional co-investment, performance-linked instruments	Impact investors, sovereign wealth funds, public-private partnership units
Lack of liquidity or exit strategies for investors	Creation of green bond markets, green securitization platforms, blended finance exits	Securities exchanges, central banks, climate investment funds

Source: Authors' elaboration

Box 6. Summary of key insights and policy implications

- Administrative complexity and stringent criteria limit access to climate finance for SIDS and LDCs, despite significant funding availability globally.
- Basel III risk-weight frameworks disproportionately penalise investments in climate-vulnerable economies due to high perceived sovereign and credit risk.

Policy recommendations:

1. Introduce simplified and standardised project preparation mechanisms in international climate funds specifically tailored to low-capacity countries.
2. Revise Basel III frameworks to include differentiated, climate-adjusted risk-weight approaches, reducing capital costs for verified green investments and sovereign debt of climate-vulnerable countries.
3. Encourage international alignment of green taxonomies and disclosure standards to boost investor confidence and reduce market uncertainty in EMDEs.

3.4. Macroprudential regulations and their possible impacts

Macroprudential regulations profoundly shape global investment flows by altering financial institutions' risk perceptions, capital adequacy constraints, and credit allocation decisions. Particularly crucial for long-term sustainable and green finance, these regulations influence cross-border capital flows towards sustainable projects. The Basel III framework – comprising capital adequacy requirements, leverage ratios, liquidity coverage ratios and risk-weighting approaches – forms the backbone of these regulations, complemented by national regulations issued by central banks and financial supervisory authorities.

Risk-based capital allocation

Risk weighting and capital adequacy rules directly influence banks' cost of capital and credit allocation practices. Under Basel III, banks must hold capital proportional to their assets' risk profiles, determined through risk-weighting mechanisms. Developing economies, particularly LDCs and SIDS, often face higher risk weights due to perceived political instability, weaker institutional frameworks and lower sovereign credit ratings. For example, Mozambique and Ethiopia have higher capital charges due to risk weights reaching up to 150% on sovereign debt, sharply contrasting with the 0% risk weight typically applied to OECD economies. This regulatory practice significantly elevates capital costs and discourages financial institutions from lending to sustainable infrastructure or renewable energy projects (Reinhart & Rogoff, 2010; Obstfeld, 2021).

Alternative classifications, such as differentiated risk assessments that incorporate climate risk explicitly, could alleviate these constraints. Introducing "green supporting factors" – lower risk weights for sustainable projects – and "brown penalising factors" – higher risk weights for carbon-intensive assets – can substantially redirect capital flows toward sustainable sectors. China's successful implementation of differentiated risk weights has significantly boosted private sector investment in renewable energy and sustainable infrastructure (Lamperti et al., 2021; NGFS, 2022a).

Credit and lending practices

Macroprudential measures alter the composition of bank lending, affecting credit availability and financial inclusion in developing economies where capital availability is already constrained. Stricter regulations on fossil fuel financing combined with incentives for green investments drive banks to shift their lending portfolios. This shift is particularly visible in countries such as Jamaica, where limited institutional capacity necessitates public-private initiatives like the Green Economy Investment Strategy (GEIS) to channel investment effectively. However, as is visible in Section 2, data highlights significant disparities: countries with stronger financial institutions (e.g., China, Brazil and South Africa) successfully integrate regulatory incentives to mobilise green financing, while countries with weaker institutions experience constrained lending due to regulatory uncertainty and higher compliance costs.

Market pricing and asset revaluation

Climate risks embedded in regulatory frameworks significantly impact asset valuations, influencing market prices, bond yields and sovereign credit ratings. Developed economies, equipped with robust climate disclosure frameworks such as the EU Taxonomy and TCFD, experience proactive reallocation of funds toward sustainable assets. Conversely, developing countries face greater market volatility stemming from regulatory uncertainties. Data-driven insights show that increased disclosure requirements and enhanced regulatory clarity positively correlate with more stable asset

valuations in OECD economies. In contrast, economies such as Ethiopia and Mozambique continue to experience volatile asset pricing due to persistent uncertainty about climate risk alignment and weaker enforcement of climate-related financial disclosures (Battiston et al., 2017; NGFS, 2022b).

Liquidity requirements

Basel III's Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) profoundly influence investment in long-term green infrastructure projects. These liquidity measures require banks to hold sufficient HQLAs to manage short-term disruptions. Green projects, typically characterised by higher initial costs and longer payback periods, are disproportionately affected, appearing less liquid and riskier from a regulatory standpoint. Countries such as Jamaica and the Maldives, heavily reliant on external financing for climate resilience, face severe constraints from these liquidity requirements, undermining their efforts to attract sustained investment flows.

The data highlights an urgent need for recalibration of liquidity regulations to accommodate long-term sustainable investments. Adjusting definitions of HQLAs to include verified green assets and conducting stress tests under climate scenarios could significantly reduce these barriers and support continuous capital flows essential for climate resilience in vulnerable economies (Batten et al., 2016; FSB, 2020).

Cross-border investment flows

Macroprudential regulations in advanced economies directly shape cross-border investment flows to developing countries. Stringent capital and liquidity regulations can amplify risk perceptions, inadvertently leading to capital flight or reduced cross-border lending to emerging markets. Empirical data analysis shows that post-2008 regulations have resulted in a significant decline in cross-border lending, particularly affecting Sub-Saharan Africa and small island economies (Claessens & van Horen, 2014). Conversely, clear and favourable regulatory environments in advanced economies, demonstrated through frameworks like the EU Taxonomy, can stimulate targeted green investments across borders, benefiting emerging economies like Brazil and India.

Ensuring a just transition through inclusive green finance

Beyond environmental goals, climate-aligned macroprudential regulation must also advance a just transition – one that ensures no community, sector or region is left behind in the shift to a low-carbon economy. This is not merely a moral imperative, but a financial stability concern: unmanaged transitions can amplify credit and market risks via job losses, industrial decline and political backlash, particularly in fossil-dependent or low-income regions (ILO, 2023; Biggs and Mey, 2020).

While macroprudential reforms are essential to align financial systems with climate objectives, their distributional impacts must also be carefully considered. In the absence of safeguards, green-oriented regulatory tightening – such as increased capital requirements for carbon-intensive sectors – could exacerbate financial exclusion, disproportionately affecting MSMEs, low-income households and labour-intensive industries undergoing transition. For example, higher risk weights or liquidity coverage restrictions may limit credit availability in sectors where large portions of the population are employed, particularly in informal or rural economies.

Integrating "just transition" principles into macroprudential policymaking is thus critical. This entails designing financial regulations that not only manage climate risk but also facilitate equitable access to green finance, particularly for marginalised groups. Green credit allocation tools and blended finance mechanisms should explicitly include social filters, such as supporting MSMEs in agriculture,

women-led enterprises or cooperatives in renewable energy deployment. Moreover, financial inclusion strategies – such as linking green finance to microfinance institutions, cooperative banks or development banks – can enhance the resilience of vulnerable communities while broadening the green finance ecosystem.

Regulators in both developed and emerging markets are beginning to explore macroprudential instruments that incorporate social co-benefits and distributional equity. For instance, employment-adjusted stress tests, place-based capital buffers and social taxonomy-linked green supporting factors are being considered to mitigate systemic risks from uneven transitions. These tools aim to incentivise financial flows toward projects that create local jobs, support MSMEs or empower marginalized communities, while aligning with climate targets.

Importantly, such approaches can complement financial inclusion efforts. By enabling microfinance institutions, cooperative banks and social development funds to access green credit on preferential terms, central banks and financial supervisors can widen the base of climate-resilient entrepreneurship and reduce vulnerability to transition shocks. National development banks and public-private guarantee schemes can also prioritise regions or demographics at high risk of exclusion.

A Just Transition lens reinforces the principle that climate risk is deeply entangled with social and economic vulnerability, particularly in the Global South. Aligning macroprudential reform with inclusive development strategies ensures a more stable, politically viable and socially just financial system – one that promotes not only decarbonisation but also equity and resilience.

Recognising the socio-economic dimensions of financial reform ensures that climate-aligned macroprudential policy supports an orderly and just transition – one that delivers climate resilience without sacrificing equity or developmental priorities.

To address these transmission channels effectively, differentiated macroprudential policies tailored to country-specific risks, institutional capacities and financial system maturity levels are necessary. Data-driven insights reinforce the need for international cooperation and regulatory harmonization, facilitating equitable and effective mobilisation of sustainable finance globally. By adjusting these regulatory mechanisms, financial stability objectives can be achieved while simultaneously supporting robust investment flows toward sustainable development in emerging and developing economies.

The effectiveness of macroprudential regulations in channelling investment flows toward sustainable sectors depends critically on institutional mandates and governance structures. While regulatory tools such as green-supporting factors and differentiated risk weights have clear theoretical benefits, their practical implementation is contingent upon how financial regulators and central banks interpret their mandates. Institutional clarity and governance arrangements define the scope within which regulators can act, determining whether climate risks and sustainability objectives become core components of financial stability agendas or remain peripheral concerns.

Understanding institutional mandates and governance structures is therefore essential to diagnose why regulatory responses to climate risks vary significantly across countries. Central banks and financial supervisors operating under narrowly defined mandates – primarily focused on price stability or traditional financial risks – may hesitate to integrate climate risks explicitly, perceiving them as secondary or beyond their immediate jurisdiction (D'Orazio & Popoyan, 2023). Conversely, those with broader or dual mandates that explicitly include financial stability or economic development are better positioned institutionally to embed climate-related concerns into macroprudential policy frameworks.

Box 7. Summary of key insights and policy implications

- Macroprudential regulations (risk weights, capital adequacy, liquidity ratios) substantially influence capital flows by altering risk perceptions, often disadvantaging long-term sustainable investments in EMDEs.
- Countries with explicit climate risk integration in financial regulation (e.g., China's green-supporting factors) demonstrate enhanced private capital mobilisation for sustainable sectors.

Policy recommendations:

1. Clearly integrate climate risks into Basel III instruments, including green supporting factors, brown penalising factors and adjusted liquidity definitions, explicitly incentivising sustainable long-term investments.
2. Regulatory frameworks should mandate stress testing under climate scenarios, aligning regulatory incentives explicitly with sustainable development priorities, particularly benefiting climate-vulnerable EMDEs.
3. Expand blended finance instruments (e.g., guarantees, concessional co-investment mechanisms) to offset macroprudential barriers, improving risk-return profiles and attracting greater private-sector participation in climate finance.

While the preceding analysis outlines the structural and theoretical implications of macroprudential instruments for green investment, the practical experience of financial institutions themselves provides essential context. **Section 3.5** therefore presents qualitative evidence from a targeted survey conducted with banks in different regulatory environments, offering insight into how these dynamics are perceived in practice.

3.5. Survey insights on green macroprudential regulation

Methodology and scope

To complement the cross-country regulatory mapping, a short, structured survey was undertaken to capture first-hand perceptions of banks regarding green macroprudential regulation and climate-related financial risks. 40 institutions across four income groups – OECD, emerging markets, LDCs and SIDS – were contacted. Despite wide dissemination and extended deadlines, only two institutions provided comprehensive responses: one from Southern Europe, representing a large internationally active commercial bank; and one from Latin America, representing a major national development bank.

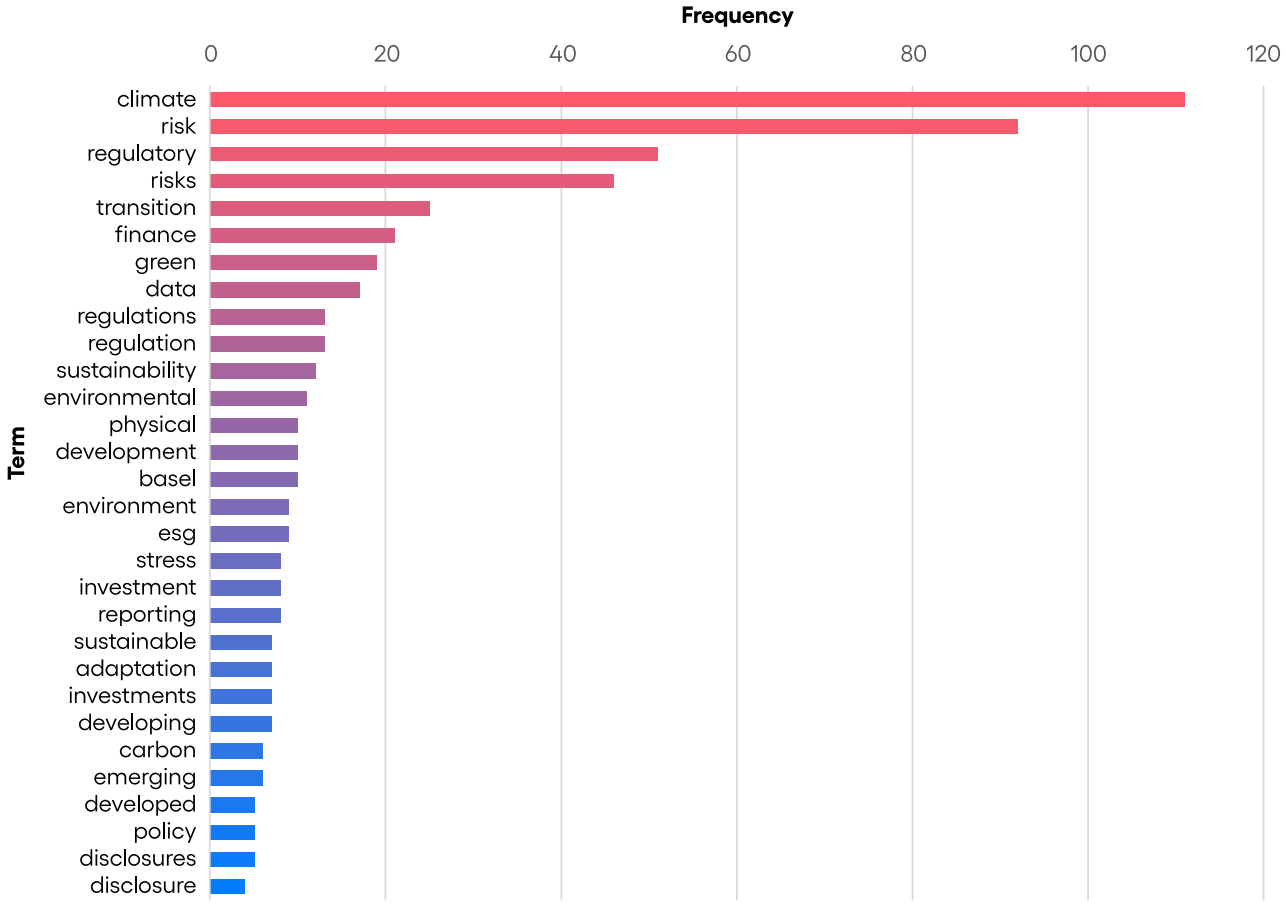
The low response rate itself is revealing. It signals the sensitivity and institutional hesitancy surrounding climate-related prudential policies. Banks often view these topics as strategically and reputationally delicate, constrained by disclosure limits or uncertainty over supervisory expectations. The scarcity of replies and difficulty in obtaining responses thus reflects an underlying institutional caution and uneven regulatory maturity. This finding is consistent with this report's broader conclusion that green macroprudential policy remains at an early and fragmented stage of implementation globally.

The survey consisted of 20 questions organised in two parts:

i. risk and regulatory environment, exploring climate-risk perception, regulatory readiness and data capacity; and

ii. investment appetite and policy barriers, examining how prudential requirements shape credit flows towards sustainable sectors and emerging markets.

Figure 13: Top 30 sustainability-related terms in the survey classified by frequency



Source: Authors' elaboration based on the survey data

Figure 14: Most frequent sustainability-related terms in bank survey responses

Source: Authors' elaboration based on the survey data

Figure 13 presents the frequency of sustainability-related terms extracted from both responses, while **Figure 14** illustrates their relative salience through a word cloud. Together they capture the narrative emphasis placed by respondents on climate, risk, regulation, transition and finance.

The lexical concentration on "climate" (111 occurrences) and "risk" (92) highlights that climate-related risk management remains the core conceptual entry point through which banks engage with sustainability. Frequent mention of "regulation," "data," "Basel" and "green" confirms that regulatory compliance and information availability are perceived as the principal enabling or constraining factors for sustainable finance.

Survey structure

The survey questions explored the following key dimensions:

- Perceived materiality of climate risks and their classification (physical, transition, liability);
- Integration of climate risk into credit risk assessment and internal stress-testing practices;
- Adoption of regulatory frameworks (e.g., TCFD, NGFS, ISSB standards);
- Challenges in compliance (e.g., data gaps, regulatory uncertainty, compliance costs);
- Impact of existing prudential regulations on lending toward carbon-intensive and green sectors;
- Institutional appetite for green investments domestically and cross-border, particularly in EMDEs; and
- Preferred policy interventions to strengthen the stability and predictability of green financial flows.

Qualitatively, both banks recognise climate change as a material financial risk, yet their regulatory environments shape distinct responses. The Southern European commercial bank operates under a mature but stringent regime, integrating transition risk into stress testing and capital planning, while expressing concern over overlapping disclosure and prudential requirements that raise capital costs for green projects – especially cross-border ones. At the same time, the Latin American development bank faces physical risks and data scarcity, aligning progressively with the national central bank's sustainability roadmap but constrained by limited technical capacity and absence of regional taxonomies. Both institutions, though, underscored three common challenges: (1) insufficient data granularity and taxonomy alignment; (2) capital cost asymmetry that penalises emerging-market exposures under Basel III; and (3) regulatory divergence that fragments disclosure and supervisory practices.

These findings reinforce the central argument of this report: that current prudential architectures, while advancing in advanced economies, remain misaligned with the developmental and risk profiles of emerging markets, thus curbing the global flow of green capital.

From a policy perspective, both banks converged on the need for:

- Internationally harmonised disclosure and reporting frameworks (ISSB, NGFS);
- Climate-sensitive capital treatment that differentiates between green and brown assets; and
- Expanded technical assistance to build supervisory and data capacities in developing economies.

The qualitative and lexical evidence combined demonstrates that institutional hesitancy, asymmetric readiness and regulatory fragmentation jointly hinder the scaling of green finance. The results also corroborate earlier macro-level patterns (**Sections 2 and 3.4**) and anticipate the cross-cutting policy recommendations in **Section 4** on climate-aligned prudential coordination.

Summary of responses

Although limited in number, the two responses offer meaningful insights into the contrasting positions of banks operating under advanced and emerging regulatory environments.

The Southern European commercial bank described climate risk as fully integrated into its risk management and capital planning systems, supported by in-house stress testing, alignment with international disclosure frameworks (TCFD, ISSB) and comprehensive governance structures. Its main concerns center on regulatory fragmentation and data quality, particularly the inconsistency of supervisory expectations across jurisdictions, which increases compliance costs and constrains cross-border green financing.

By contrast, the Latin American development bank considered climate change an extremely material issue for national development and financial stability but reported limited quantitative integration due to evolving regulatory standards and data gaps. It follows the national central bank's sustainability agenda, which is progressively incorporating ISSB standards. The institution highlighted the dual importance of physical risks (e.g., droughts, deforestation) and transition risks related to energy and fiscal dependencies.

Both banks reported data availability and regulatory divergence as the most significant barriers to integrating climate risk into operations. The European bank emphasised the capital cost asymmetry created by Basel III's risk-weighting and disclosure frameworks, which discourage lending to emerging markets. The Latin American bank pointed to the lack of harmonised green taxonomies and limited technical capacity as critical obstacles.

Emerging themes and policy implications

1. **Asymmetry in readiness:** Institutions in advanced economies operate under mature but stringent frameworks, while those in emerging economies face capacity and data constraints despite growing awareness and engagement.
2. **Regulatory divergence:** Both respondents emphasised the absence of internationally consistent prudential and disclosure standards as a major impediment to scaling climate finance.
3. **Capital disincentives:** Existing Basel III structures tend to penalise climate-aligned investments, particularly in developing economies, confirming this brief's quantitative findings.
4. **Policy priorities:** Respondents called for (i) harmonised and ISSB-based disclosure frameworks, (ii) calibrated capital treatment for verified green investments, and (iii) expanded technical assistance and capacity-building for supervisors and financial institutions in emerging markets.

Interpretation

The overall outcome of the survey highlights that institutional reticence itself is a form of evidence. The low participation rate reveals the sensitivity surrounding climate-related prudential discussions and the ongoing uncertainty over supervisory expectations. This hesitation underscores the need for clearer regulatory guidance, improved cross-border coordination and safe channels for dialogue between regulators and financial institutions. Even with two responses, the findings mirror the global reality described throughout this report: that green macroprudential regulation is still emergent, heterogeneous, and marked by asymmetrical capacity across jurisdictions.

Table 5: Cross-regional insights from the bank survey

Dimension	Bank from Southern Europe	Bank from Latin America
Climate risk perception	Fully integrated in ICAAP and risk governance	Extremely material; partially integrated
Primary risk focus	Transition (policy, market, reputation)	Physical (deforestation, droughts) and transition
Key compliance challenge	Regulatory fragmentation; compliance cost	Data gaps; limited technical capacity
EMDE green finance appetite	Constrained by Basel III capital costs	Domestic focus; regional cooperation
Priority policy needs	ISSB-aligned disclosures, capital incentives	Public guarantees, adaptation finance, taxonomy clarity

Source: Authors' elaboration based on survey data

3.6. Institutional mandates and governance structures: explaining policy uptake

The survey findings (**Section 3.5**) indicate that institutional hesitancy and unclear supervisory expectations remain widespread. Strengthening government mandates and coordination mechanisms is thus critical to provide consistent guidance and incentives for banks to internalise climate-related prudential norms. Hence, the ability of countries to adopt green macroprudential regulations is not solely a function of financial system maturity or climate vulnerability. Institutional arrangements, particularly the legal mandates of central banks and the governance structure of financial stability frameworks, critically shape the adoption and implementation of green macroprudential regulations. **Figures 13 and 14** illustrate this relationship, highlighting substantial differences across OECD countries, emerging economies, LDCs and SIDS.

The institutional architecture governing monetary policy and financial regulation plays a critical role in shaping the feasibility and timing of green macroprudential interventions. A growing body of literature highlights the inherent tension between monetary and financial stability objectives when both are housed within a single institution (Goodhart, 2011; Smets, 2014). Central banks that are tasked with maintaining price stability and simultaneously overseeing financial stability may face trade-offs, particularly when financial regulatory measures – such as green capital requirements- are perceived to undermine inflation control or distort market functioning. In such situations, central banks tend to privilege their primary mandate, typically price stability, resulting in delayed or weaker implementation of regulatory innovations (Tucker, 2018).

Moreover, the coordination of macroprudential and sustainability mandates also unfolds within a broader political economy context. Financial and corporate stakeholders exert significant influence on how climate-related prudential frameworks evolve, using lobbying and consultation mechanisms to shape the pace and scope of reforms (see Errichello et al., 2025a,b). Recent evidence from advanced and emerging economies suggests that climate lobbying has transitioned from outright resistance to strategic influence, seeking to moderate or delay regulatory changes rather than oppose them directly. Banks and large corporations increasingly frame their lobbying as efforts to ensure proportionality, data availability and competitiveness – positions that are legitimate but often lead to gradualism rather than transformative regulation.

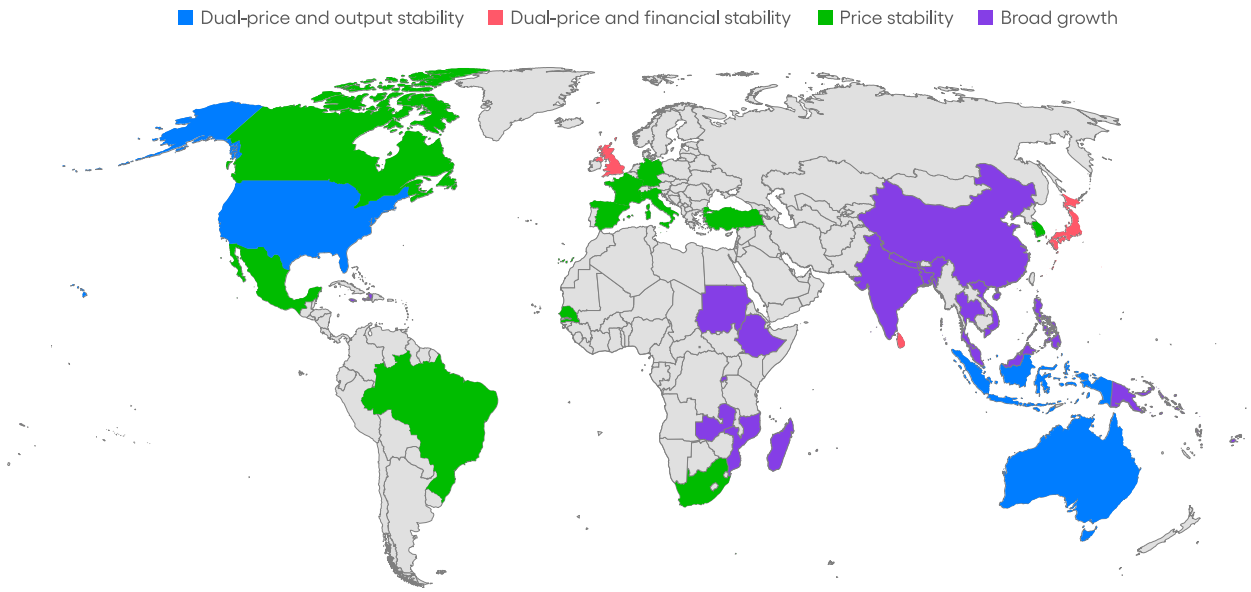
Green macroprudential policies are particularly vulnerable to such institutional frictions. Efforts by central banks to support climate-aligned sectors through differentiated risk assessments or

preferential capital treatments have often been criticized for contravening the principle of market neutrality, which remains central to many inflation-targeting regimes (Dikau & Volz, 2021; Campiglio et al., 2018). This principle holds that monetary authorities should not unduly influence the allocation of credit across sectors, which in practice has limited their willingness to engage in targeted green interventions.

Institutional arrangements can help mitigate these constraints. Empirical evidence suggests that green macroprudential policies are more likely to emerge in jurisdictions where the financial stability mandate is assigned to an institution other than the central bank, or where the functions are clearly compartmentalized (D'Orazio & Popoyan, 2019). Such setups reduce internal conflicts of interest and ease the adoption of climate-related tools by insulating them from the strictures of market neutrality. Conversely, where both monetary and macroprudential powers are unified under a central bank with a strong commitment to inflation targeting – whether as a single or primary objective – the integration of climate objectives tends to be limited. In these contexts, coordination failures between climate, monetary and financial regulatory goals become more salient (Baer et al., 2021).

Figure 15 categorises central bank mandates into four main groups: single mandates exclusively focused on price stability (e.g., Brazil, Mexico, South Africa); dual mandates incorporating either output stability (e.g., US, Australia, Indonesia) or financial stability (e.g., Japan, UK, Sri Lanka); and broad mandates that cover multiple objectives, including economic growth, exchange rate stability, price and financial stability (e.g., Ethiopia, Nepal, Senegal). OECD countries predominantly feature dual mandates explicitly including financial stability or broader economic objectives, facilitating their advanced integration of climate considerations into macroprudential frameworks. For instance, the UK and Japan leverage dual mandates to actively incorporate systemic climate risk management, supported by robust institutional capacities and advanced financial markets.

Figure 15: Types of central bank mandates in 2025

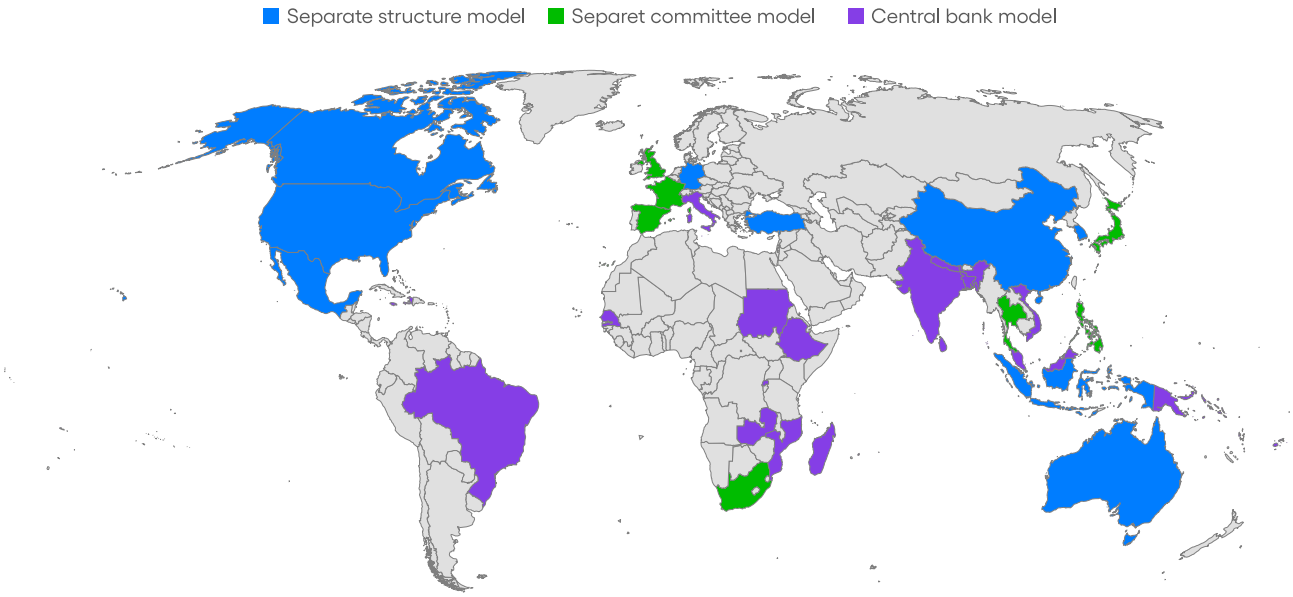


Source: Authors' elaboration on data retrieved from the Central Banks Legislation Database, BIS and central bank official documents

Emerging economies frequently exhibit either single mandates focused narrowly on price stability or dual mandates involving broader economic stability. Countries like Brazil and South Africa, with single mandates, face notable institutional constraints in proactively pursuing climate-aligned

financial policies due to their strict mandate limitations. However, countries like Indonesia, with dual mandates including output stability, possess greater potential flexibility, although practical adoption remains constrained by institutional capacity and market maturity.

Figure 16: Types of financial stability governance structures in 2025



Source: Authors' elaboration on data retrieved from the Central Banks Legislation Database, BIS, Central Bank and financial regulators' official documents

Beyond mandates, the governance arrangements governing macroprudential policymaking further shape regulatory capacity and responsiveness. Fragmented governance structures can complicate coordination among multiple supervisory bodies, leading to delays or diluted regulatory actions. On the other hand, centralised or clearly defined committee structures facilitate more coherent, decisive interventions, significantly enhancing the speed and effectiveness of integrating climate risks into financial regulation. Governance frameworks thus not only influence the regulatory pace but also critically determine the overall effectiveness in channelling financial flows toward sustainable sectors.

Figure 16 distinguishes three financial stability governance structures: the central bank model, the separate committee model and the separate structure model. Notably, OECD countries primarily adopt either the central bank model or separate committee model, fostering policy coherence, institutional integration and effective climate-risk management. European countries, operating within centralised frameworks like the ECB, exhibit enhanced capacity for integrating sustainability measures into financial oversight.

Emerging economies predominantly use the separate committee or separate structure models, complicating climate policy coherence and coordination. Countries like Brazil have developed separate committee structures that partially facilitate policy alignment, whereas fragmented regulatory arrangements in countries like South Africa significantly delay cohesive policy adoption.

Contrary to initial assumptions, many LDCs and SIDS employ the central bank model, wherein monetary policy and prudential oversight reside within a single institution. While theoretically facilitating policy coherence, in practice, this model often creates internal conflicts, particularly between short-term monetary policy goals and long-term financial stability objectives. Limited institutional capacity, scarce resources and immediate economic vulnerabilities typically exacerbate

these internal conflicts, significantly restricting the effective adoption of comprehensive green macroprudential policies. Thus, despite centralised frameworks, countries such as Ethiopia, Nepal and Senegal experience substantial challenges in aligning their central bank's financial stability objectives with sustainability measures.

Recognising these institutional and governance-related barriers provides valuable insights into targeted policy recommendations. Efforts to enhance regulatory coherence and institutional capacity – such as clarifying mandates, streamlining governance arrangements and fostering better inter-agency coordination – are crucial to enabling the effective implementation of green macroprudential policies. The following section will build on these insights, proposing specific institutional and governance reforms designed to overcome barriers, unlock regulatory potential and ultimately strengthen investment flows into sustainable and climate-resilient projects in emerging and developing economies.

Box 8. Summary of key insights and policy implications:

- Central bank mandates and governance structures strongly influence the adoption of green macroprudential policies, with narrow mandates restricting climate-risk integration.
- Countries with clear institutional frameworks (central banks with broader mandates or separate committees) show greater effectiveness in regulatory climate integration.

Policy recommendations:

1. Revise central bank mandates explicitly to integrate climate and sustainability considerations, enabling proactive policymaking.
2. Strengthen inter-agency coordination structures (e.g., dedicated committees or working groups) to streamline climate-risk integration across monetary, financial and fiscal regulatory frameworks.
3. Enhance institutional capacity building and knowledge transfer on climate-risk management, particularly targeted at central banks and financial supervisors in LDCs and SIDS.

4. Policy pathways for climate-aligned macroprudential reform

The survey evidence presented in **Section 3.5** underscores the urgency of internationally harmonised frameworks and capacity-building initiatives. Respondents from both advanced and emerging economies emphasised that regulatory fragmentation, data scarcity and asymmetric capital treatment constrain the scaling of green finance. The following recommendations directly address these concerns.

This section translates the analytical findings of the report into a concrete policy agenda. Recognising that macroprudential frameworks were not originally designed with climate risk in mind, it offers a roadmap for reform that is both climate-responsive and development-sensitive. Drawing on the typology of countries introduced earlier, the section outlines four strategic entry points for rethinking macroprudential tools and financial architecture. These include adjustments to risk-based capital regulation, the deployment of climate-aligned macroprudential instruments, the integration of transition equity into supervisory frameworks and enhanced coordination between domestic and international financial actors. Each subsection highlights not only the technical rationale for reform but also the political and institutional conditions under which these recommendations could be implemented most effectively. Together, these proposals aim to shift the macroprudential paradigm from one of risk aversion to one that enables sustainable, inclusive, and climate-resilient investment.

4.1. Innovative approaches: aligning prudential regulation with sustainable investment needs

The integration of climate objectives into macroprudential policy calls for a new generation of regulatory approaches that balance financial stability with the need to mobilise large-scale investment toward sustainable development. Traditional prudential frameworks – designed primarily to prevent credit booms and systemic bank failures – were not built to respond to the long-term, non-linear nature of climate risk. As such, there is a growing consensus that prudential innovation is required to manage the dual mandate of stability and sustainability, particularly in EDMEs where financing gaps are most severe.

One promising avenue is the development of climate-sensitive capital frameworks that adjust prudential requirements to reflect both the risk characteristics and societal value of green investments. This includes recalibrating capital charges for climate-aligned assets based on forward-looking risk assessments and developing dynamic provisioning models that account for climate-related risk accumulation over time. These innovations are increasingly recognised not only as environmental imperatives but as necessary corrections to outdated risk metrics that overlook the latent vulnerabilities of carbon-intensive exposures.

In parallel, supervisory authorities can employ differentiated macroprudential tools that tailor regulatory expectations to national circumstances and climate risk profiles. For example, countries highly exposed to physical risk may implement stricter loan-to-value or sectoral capital buffer requirements for the financing infrastructure of banks in vulnerable coastal zones. Conversely, jurisdictions pursuing decarbonisation targets may use targeted green credit allocation quotas or sectoral leverage adjustments to promote investment in renewable energy or low-carbon transport. These tools, while unconventional, are fully compatible with the counter-cyclical logic of macroprudential policy if designed transparently and with adequate safeguards.

Another area of innovation lies in the integration of climate stress testing into prudential frameworks – not just as an informational exercise but as a mechanism to inform regulatory calibration. Central banks in advanced economies (e.g., the ECB and BoE) have begun pilot programmes where stress test results influence supervisory dialogue, Pillar 2 expectations, and even systemic risk buffers. For EDMEs, simplified or qualitative climate stress testing models – developed with technical assistance – can provide a starting point for embedding climate risk into supervisory reviews and capital planning processes, even in data-constrained environments.

Importantly, regulatory innovation must also extend to the institutional architecture of climate finance governance. Cross-cutting coordination between central banks, ministries of finance, environmental regulators and DFIs is essential to ensure that prudential policy adjustments are aligned with national climate strategies, investment plans and just transition objectives. This requires not only policy coherence but legal mandates and institutional frameworks that empower financial supervisors to act on climate-related financial risks.

To ensure credibility and market acceptance, innovative regulatory tools must be underpinned by robust data, scenario analysis and validation mechanisms. While some experimentation is inevitable, regulators must be transparent about the objectives and risk assumptions behind new instruments. Clear communication with financial institutions and international standard-setters – particularly the Basel Committee and NGFS – is crucial to avoid regulatory fragmentation or unintended risk transmission across borders.

In short, climate-related financial innovation must be pragmatic, risk-sensitive and development-aware. It must recognise the asymmetry between advanced and developing financial systems and build flexibility into global frameworks that currently prioritise universal rules over contextual relevance. Innovative macroprudential approaches can enable countries to achieve climate goals without compromising financial soundness – provided they are embedded in an evidence-based and collaborative policy process.

Designing innovative macroprudential tools requires a context-sensitive approach that acknowledges the heterogeneity of countries' climate exposure, institutional capacity and financial system maturity. In LDCs and SIDS, where regulatory infrastructure is limited and climate vulnerability is high, policy innovation should focus on simplified and high-impact tools – such as concessional risk-weight adjustments for green sovereign bonds, or integration of climate risk into basic capital adequacy assessments. Here, partnerships with development banks and technical assistance providers can help embed climate considerations into nascent supervisory practices.

In emerging economies, regulators may build on existing supervisory capacity to implement more granular tools – such as green sectoral capital buffers, dynamic provisioning rules linked to physical risk zones or climate-aligned loan-to-value ratios in real estate and infrastructure lending. Pilot climate stress tests and disclosure standards can also be scaled up with support from international platforms like NGFS or IMF's Climate Lab.

For advanced economies, the innovation frontier lies in refining existing frameworks by embedding double materiality, climate scenario modelling and brown penalising factors directly into prudential regulation. Given their global systemic relevance, OECD countries also bear responsibility for aligning their outward investment flows – especially through banks, asset managers and insurers – with sustainability goals in developing markets. Their regulatory innovation must also facilitate cross-border capital flows by recognising climate-adjusted risk metrics across jurisdictions.

A more proportionate reflection of actual project risk is needed within Basel III's capital framework. Regulators should update risk-weight methodologies to integrate the proven de-risking effects of credit enhancement instruments, such as first-loss guarantees, blended finance tranches and political risk insurance. Recognising these mechanisms can materially reduce capital costs for banks financing climate projects in EMDEs, enabling a more equitable flow of private capital to high-impact regions. Moreover, by recognising these differentiated starting points, regulators can ensure that macroprudential innovation is not only effective and risk-based but also equitable and globally coordinated.

4.2. Scaling factors for climate investments: using differentiated capital treatment to steer finance

One of the most actively debated tools in the evolving macroprudential climate agenda is the use of scaling factors – adjustments to regulatory capital treatment that either penalise "brown" (carbon-intensive) exposures or support "green" (sustainable) ones. These tools operate by altering the risk-weighted asset (RWA) calculations that determine banks' capital requirements, effectively shaping the cost of credit for different asset classes. When properly designed, scaling factors can simultaneously correct for climate-related market failures, reflect forward-looking risks and reorient financial flows toward sustainability.

There are two broad categories of scaling factors:

- Brown penalising factors (BPFs): Higher capital requirements for assets exposed to significant transition or physical risks (e.g., coal infrastructure, coastal real estate, high-emitting sectors)

$$CAR_{green}^{BPF} = \frac{Equity}{RWA} = \frac{Equity}{(\alpha_b + \alpha_{BPF}) * P_b + \alpha_g * P_g}$$

where $Equity$ is the bank's capital, the RWA bank's risk-weighted assets, $\alpha_b * P_b$ and, $\alpha_g * P_g$ are the brown and the green risk-weighted asset portfolios, respectively, and α_{BPF} is a mark-up on a green asset risk-weight.

- Green supporting factors (GSFs): Lower capital requirements for climate-aligned assets (e.g., renewable energy projects, green-certified buildings, low-emission transport)

$$CAR_{green}^{GSF} = \frac{Equity}{RWA} = \frac{Equity}{\alpha_b * P_b + (\alpha_g - \alpha_{GSF}) * P_g},$$

where $Equity$ is the bank's capital, the RWA bank's risk-weighted assets, $\alpha_b * P_b$ and, $\alpha_g * P_g$ are the brown and the green risk-weighted asset portfolios, respectively, and α_{GSF} is a mark- down on a green asset risk-weight.

Although appealing as incentive mechanisms, the application of these tools requires careful calibration, given concerns about undermining prudential soundness. Empirical evidence on whether green assets are systematically less risky remains inconclusive, and there is risk of moral hazard or "regulatory arbitrage" if these tools are not grounded in solid risk data (ECB, 2021; BoE, 2022). Nonetheless, the status quo – where climate risks are often underpriced in prudential regulation – creates distortions that disincentivise green investment, particularly in risk-sensitive banking systems of emerging and developing economies.

A balanced approach would combine green supporting measures for verified low-risk projects, with brown penalising factors for high-risk exposures, guided by enhanced climate disclosures and stress testing. For

instance, China has applied GSFs to promote green lending by allowing lower RWAs on certified green loans, while maintaining supervisory oversight on underlying credit quality. The EU has explored both GSFs and BPFs but remains cautious about implementation in the absence of conclusive risk differentiation.

To support scaling factor implementation across country contexts, graduated approaches are essential:

- In LDCs and SIDS, where financial systems are nascent and risk data is sparse, scaling factors could be introduced through simplified metrics, such as concessional risk weights for sovereign-backed green bonds or small-scale renewable energy finance. These could be accompanied by donor-backed credit guarantees to reduce default risks.
- In emerging economies, regulators can begin integrating sector-specific RWAs, adjusting capital charges for green industrial sectors while penalising exposures to fossil fuel-heavy portfolios. This can be done incrementally through pilot programmes and guided by local taxonomies and climate stress testing.
- In OECD economies, where data and institutional capacity are more advanced, scaling factors can be embedded into IRB models, linked to stress testing results or integrated into Pillar 2 guidance. Here, implementation can be aligned with mandatory climate disclosures and forward-looking supervisory frameworks.

Importantly, scaling factors should not be viewed as standalone tools, but rather as components of an integrated risk and policy framework. Their effectiveness hinges on consistent green taxonomies, robust project verification systems and disclosure regimes that mitigate the risk of greenwashing. Moreover, their application should be transparent, time-bound and subject to review, especially in jurisdictions where political pressure or market volatility may tempt overly generous incentives.

To ensure legitimacy and alignment with global financial standards, any deployment of scaling factors should be coordinated through international regulatory platforms such as the Basel Committee on Banking Supervision (BCBS), the Network for Greening the Financial System (NGFS) and regional supervisory colleges. This is especially critical in maintaining cross-border regulatory coherence while respecting local priorities and vulnerabilities.

In sum, scaling factors offer a pragmatic and technically feasible tool to bridge the investment gap in climate-critical sectors – provided they are risk-sensitive, context-aware and embedded in a broader effort to green financial systems.

Table 6: Types of scaling factors and application on four groups of countries

Type of scaling factor	Risk-based justification	Recommended use by country group	Supervisory preconditions
Green supporting factor (GSF)	Assumes green assets may be less exposed to transition/ physical risks; promotes positive spillovers	• **LDCs/SIDS:** Apply to sovereign-backed green bonds and concessional green loans • **Emerging economies:** Apply to certified green sectors (e.g., clean transport) • **OECD:** Integrate into IRB models based on forward-looking climate scenarios	• Defined green taxonomy • Asset verification mechanisms • Disclosure standards and green audit trails

Type of scaling factor	Risk-based justification	Recommended use by country group	Supervisory preconditions
Brown penalising factor (BPF)	High carbon intensity increases transition risk exposure; reduces resilience under policy shocks	• **Emerging economies:** Higher capital charges for coal, oil and gas exposures • **OECD:** Mandatory for high-risk brown assets in real estate, industry, transport	• Climate stress test results • Sector-specific risk assessments • Supervisory Pillar 2 engagement
Sectoral RWA adjustments	Forward-looking credit risk based on climate vulnerability or mitigation importance	• **LDCs/SIDS:** Adjust RWA for agriculture or adaptation projects • **Emerging economies:** Apply to green industrial finance • **OECD:** Use for infrastructure, transport transition plans	• Sector-specific climate data • Scenario analysis • Coordination with industrial policy
Time-bound preferential treatment	Temporary incentive to build green finance markets or attract innovation capital	• **LDCs/SIDS:** Pilot concessional risk weights for local green projects • **Emerging economies:** Support green lending by public or development banks	• Sunset clauses • Independent monitoring and evaluation • Collaboration with DFIs and donors

Source: Authors' elaboration

4.3. Policy guardrails: balancing innovation with financial soundness

As financial regulators explore tools to promote climate-aligned investment, including differentiated capital treatments, green credit allocation and green-supporting factors, it is essential to simultaneously establish policy guardrails that preserve the integrity, stability and credibility of the financial system. The integration of sustainability into prudential frameworks must not come at the cost of increased systemic risk, regulatory arbitrage or misaligned incentives.

The first priority is to ensure that any climate-related regulatory adjustment is grounded in a robust, transparent and forward-looking risk assessment. Where empirical data is incomplete – particularly regarding the relative riskiness of green versus brown assets – regulators must proceed cautiously, using stress testing, expert judgment and scenario-based models to calibrate interventions. Importantly, capital relief mechanisms (such as green supporting factors) should be time-bound, subject to rigorous impact assessments and only applied to projects that meet verified environmental criteria, as defined through national or internationally recognised taxonomies.

Second, the use of blunt incentives – such as risk-weight discounts or credit quotas – must be complemented by enhanced supervisory oversight. Climate-aligned lending can introduce new types of concentration and liquidity risks, particularly in underdeveloped green markets. For example, excessive exposure to subsidized renewable energy sectors without diversification could expose banks to technology, regulatory, or project execution risks. Supervisors must therefore implement Pillar 2 add-ons, internal risk controls and monitoring frameworks that capture climate risk without disincentivising legitimate green finance.

Third, regulatory measures should be designed to minimize unintended consequences – such as procyclicality or credit tightening in vulnerable sectors. For example, if brown penalising factors are introduced too aggressively in fossil-dependent economies, banks may overcorrect by withdrawing credit from transition sectors, exacerbating social and economic disruption. In such cases, sequencing and pacing become essential guardrails. Regulatory transitions should be gradual, predictable and paired with just transition policies that support affected sectors and regions.

Additionally, cross-border regulatory coordination is vital to prevent misaligned standards and market fragmentation. Climate-aligned prudential tools must be implemented in ways that support the internationalisation of green finance, particularly from advanced economies to developing markets. Supervisors should coordinate through global platforms (such as the BCBS, NGFS and Financial Stability Board) to ensure that domestic regulations do not create regulatory arbitrage, double-counting, or perverse disincentives in global capital markets.

Finally, the success of climate-focused macroprudential reform depends on transparency and accountability. Clear regulatory objectives, public reporting on the impact of scaling factors or green asset incentives, and stakeholder engagement with financial institutions, civil society and development partners are all critical to building trust and legitimacy. A rules-based and consultative approach to innovation ensures that climate-related prudential tools are both effective and politically durable.

In sum, while climate risk justifies innovation in financial regulation, responsible innovation requires guardrails – anchored in risk, realism and regulatory integrity. By embedding these safeguards early, policymakers can foster a climate-aligned financial system that is both dynamic and resilient.

Table 7: Five policy guardrails for climate-aligned financial regulation

Guardrail	Purpose	Example/Application
1. Risk-based calibration	Ensure scaling factors and incentives are aligned with real, forward-looking risk	Use climate stress tests and scenario analysis to justify GSFs or BPFs
2. Enhanced supervisory oversight	Manage new types of risks arising from climate-focused credit expansion	Implement Pillar 2 capital add-ons, sector-specific monitoring and risk governance standards
3. Sequencing and pacing	Avoid credit shocks or unintended exclusion by phasing reforms appropriately	Gradual roll-out of BPFs in fossil-dependent economies, tied to just transition strategies
4. Cross-border regulatory coordination	Maintain consistency and avoid arbitrage in global capital markets	Align national scaling factor frameworks with BCBS, NGFS and regional supervisors
5. Transparency and accountability	Build legitimacy and enable course correction through public scrutiny	Regular disclosure of green lending trends, regulatory impact assessments, stakeholder consultations

Source: Authors' elaboration

4.4. Blended finance and risk-sharing instruments for de-risking green investment

In parallel with regulatory reforms, mobilising private capital for climate-aligned investments in emerging and developing economies requires the strategic use of blended finance and risk-sharing mechanisms. These instruments are particularly critical in contexts where macroprudential innovation alone cannot overcome the structural risk perceptions or weak market incentives that limit capital flows to green sectors.

Blended finance refers to the deliberate use of concessional finance – often from public, multilateral or philanthropic sources – to improve the risk-return profile of sustainable investments and crowd in private investors. Deployed effectively, blended finance can shift the risk calculus for institutional investors by absorbing first losses, reducing volatility or enhancing expected returns. Common tools include first-loss capital, guarantees, political risk insurance and performance-based incentives, often coupled with technical assistance or project preparation support.

Risk-sharing instruments are particularly well-suited to EMDEs, where high sovereign risk, underdeveloped capital markets and limited credit histories deter private investors from financing climate infrastructure or clean technology. For instance, partial credit guarantees provided by DFIs or MDBs can significantly reduce perceived risk for commercial lenders. Similarly, green insurance schemes – such as catastrophe bonds, agricultural weather insurance, or adaptation-linked payouts – can build financial resilience in the face of climate shocks while enabling long-term investment.

To function effectively, blended finance tools must be targeted, additional and strategically deployed. Their goal is not to subsidise private capital indiscriminately, but to bridge bankability gaps for high-impact projects that would otherwise be unviable under current market conditions. Projects in renewable energy, climate adaptation, nature-based solutions and sustainable urban infrastructure are especially well-positioned to benefit. Moreover, DFIs and MDBs should incorporate blended structures into their standard operations and explicitly align their risk mitigation strategies with national climate and financial stability goals.

Blended finance also offers a pathway to support Just Transition objectives, particularly when targeted toward MSMEs, local governments or vulnerable communities. Concessional financing can empower community-based renewable projects, green MSME credit lines or labour transition programmes in fossil-intensive regions – sectors often overlooked by commercial finance. In this way, blended instruments can complement macroprudential reforms by addressing financial exclusion and socio-economic vulnerabilities associated with the green transition.

To institutionalise the use of blended finance in financial regulation, central banks and financial supervisors should engage in structured partnerships with public development banks, DFIs and climate funds, both domestically and internationally. This includes coordinating on the design of green guarantee facilities, harmonising environmental performance standards, and integrating de-risking objectives into national sustainable finance strategies.

Finally, the effectiveness of blended finance depends on data transparency, impact measurement and governance standards. Without clear criteria for additionality and climate performance, blended structures risk generating reputational and financial risks for both public and private actors. Therefore, standardised metrics, disclosure rules and third-party verification processes are essential to ensure that de-risking tools truly support a low-carbon, climate-resilient development pathway.

Table 8: Blended finance instruments: functions and country relevance

Instrument	Function	Relevance by country group	Example use
First-loss capital	Absorbs initial investment losses to improve risk-return for private investors	• **LDCs/SIDS:** Anchor risky infrastructure or adaptation projects • **Emerging:** Crowd in banks for SME green loans	GCF support for off-grid solar in Sub-Saharan Africa
Partial credit guarantees	Backstop part of the credit risk to lower cost of capital	• **Emerging:** Green industry, urban infrastructure • **OECD:** Support for foreign direct investment in EMDEs	GuarantCo green bond guarantees in South Asia
Political risk insurance	Protects against expropriation, currency inconvertibility, etc.	• **LDCs:** Country risk mitigation for long-term projects • **Emerging:** Renewable energy scale-up	Wind projects in Latin America backed by the Multilateral Investment Guarantee Agency (MIGA)
Green insurance products	Climate-related protection (e.g., parametric or index insurance)	• **SIDS/LDCs:** agriculture and disaster resilience • **Emerging:** Climate-proofing public assets	African Risk Capacity's (AFC) sovereign drought insurance in Africa
Concessional anchor funding	Improves financial viability of blended projects through lower-cost capital	• **LDCs:** Feasibility for marginal projects • **Emerging:** Incentivise bond issuance, project finance models	IFC/climate investment funds blended investments
Project preparation facilities	Supports technical, legal and financial structuring to make projects bankable	• **All:** Especially critical in LDCs/SIDS with limited capacity	NDC Partnership, PIDG DevCo

Source: Authors' elaboration

5. Policy recommendations

This section builds on the evidence and gaps identified in **Sections 2 through 4** to offer detailed, context-specific policy recommendations aimed at recalibrating macroprudential frameworks to enhance green investment flows. Recommendations are differentiated across four groups of countries – OECD economies, emerging economies, SIDS and LDCs – reflecting their institutional mandates, financial system maturity, climate vulnerability and regulatory capacity. They are grounded in the Basel III architecture (see **Table 1**), implementation data (**Figures 3–7**) and structural constraints outlined in **Sections 3.3 to 3.6**.

5.1. OECD economies – deepen integration and lead global harmonisation

OECD economies should institutionalise the full integration of climate-related risks across all Basel III pillars. Under Pillar 1, regulators should revise capital requirements to reflect transition and physical risks – e.g., incorporating sector-specific brown penalising factors, as piloted by the ECB and EBA. These adjustments must be backed by robust scenario analysis and internal model adjustments for PD and LGD.

Supervisory mandates under Pillar 2 should be expanded to make climate scenario stress testing a binding component of ICAAP reviews. This is already underway in the EU, where the ECB integrates climate risk in SREP scores and capital guidance. Such practices should be extended to non-EU OECD countries (e.g., Australia, Canada, Japan).

Under Pillar 3, mandatory disclosure aligned with ISSB and TCFD should be enforced for all systemically important institutions. Supervisors must establish verification protocols to ensure disclosure of quality and comparability.

Finally, OECD regulators should spearhead the global convergence of green regulatory standards – particularly green taxonomies, scenario design and stress-testing methodologies – through NGFS and BCBS forums. Alignment reduces regulatory arbitrage and facilitates cross-border capital flows to emerging and developing markets.

OECD countries should embed climate risk in all Basel III pillars:

- Pillar 1: Adjust capital requirements for transition risk with brown penalising factors (e.g., ECB pilot).
- Pillar 2: Make climate scenario analysis binding in ICAAP/SREP reviews.
- Pillar 3: Enforce ISSB/TCFD disclosures with verification protocols.
- Globally: Lead alignment of taxonomies, scenarios, and green asset definitions (via NGFS, BCBS).

References: Table 1, Section 3.6, Figure 7

5.2. Emerging economies – institutionalise risk-based innovation and phase-in prudential adjustments

Emerging economies should adopt a phased approach to implementing climate-sensitive prudential instruments. Central banks and supervisors should pilot blended green supporting and brown penalising factors, applying them to verified green sectors (e.g., renewable energy, EV financing) while penalising carbon-intensive exposures. These should be framed as risk-aligned rather than promotional instruments, anchored in empirical risk differentials.

Supervisory agencies should integrate NGFS climate stress testing scenarios into routine solvency assessments. Institutions like the Reserve Bank of India and the South African Reserve Bank can serve as regional leaders in climate-related stress testing by adapting NGFS templates to domestic economic structures (e.g., agriculture, mining).

Institutional mandates must be revised to explicitly include financial stability threats from climate risks. This will reduce resistance to active regulatory engagement. Central banks in countries like Indonesia and Mexico, with broad or dual mandates, are especially well-placed to lead such institutional reforms.

National development banks (NDBs) should be embedded into macroprudential policy as strategic de-risking agents. This entails regulatory accommodation – e.g., lower capital risk weights for NDB-financed green infrastructure – and structured co-lending frameworks with commercial banks to crowd in private capital.

Deploy a phased prudential strategy:

- Introduce calibrated green supporting/brown penalising factors.
- Localise NGFS stress tests to carbon-intensive sectors.
- Revise central bank mandates to recognise climate risk.
- Integrate NDBs into risk frameworks with preferential risk weights and co-lending protocols.

References: Section 3.4, Figure 4, Box 1

5.3. SIDS – prioritise resilience integration and liquidity relief

Macroprudential frameworks in SIDS should prioritise liquidity flexibility and sovereign risk recalibration. Regulatory reforms should allow climate-resilient sovereign bonds and MDB-issued adaptation finance instruments to qualify as HQLAs under LCR and NSFR frameworks. This will reduce barriers to long-term climate finance, particularly in tourism and coastal infrastructure sectors.

Risk-weighting of sovereign exposures must be adjusted to reflect vulnerability-adjusted creditworthiness. Standardised risk metrics (e.g., V20-endorsed vulnerability indices) should be incorporated into Basel-aligned risk-weight models used by national supervisors and credit rating agencies.

Given shallow financial markets and capacity constraints, supervisory innovation should be centralised via regional hubs (e.g., Eastern Caribbean Central Bank, Pacific Financial Technical Assistance Centre). These institutions should issue regional climate disclosure standards, coordinate climate scenario libraries and manage regional supervisory sandboxes.

International standard-setters (e.g., BCBS, IMF) should formally recognise the structural constraints of SIDS and endorse carve-outs or proportional implementation of Basel III liquidity and capital buffers for verified adaptation-linked exposures.

Adjust macroprudential policy to climate realities:

- Recognise adaptation-linked bonds as HQLA.
- Use V20 vulnerability indices in sovereign RWAs.
- Centralise innovation via regional hubs (ECCB, PFTAC).
- Advocate for Basel carve-outs for small jurisdictions.

References: Section 3.3, Figure 5, Table 4

5.4. LDCs – prioritise regulatory gradualism and climate-risk recognition

LDCs require transitional regulatory frameworks that prioritise risk awareness over immediate compliance. Supervisors should adopt a 'climate risk-lite' approach – e.g., non-binding disclosure templates, qualitative climate scenario exercises and simplified green asset classifications – modelled after early-stage frameworks in Senegal and Zambia.

IFIs should incentivise and underwrite the development of resilience-linked sovereign instruments by offering partial guarantees, risk-sharing pools and preferential reserve treatment. These instruments should be integrated into domestic prudential policy through preferential capital treatment or LCR eligibility.

Credit risk models must evolve to incorporate climate vulnerability metrics (e.g., adaptive capacity, exposure to climate extremes) into sovereign credit assessments. LDC regulators should engage with credit rating agencies and MDBs to co-develop and pilot such frameworks.

To build supervisory capacity, LDCs should receive dedicated technical assistance to develop climate-adjusted ICAAP templates and transition planning modules. The IMF's Resilience and Sustainability Trust and World Bank's GEMS framework provide models for tailored capacity-building pipelines.

Adopt a risk-aware and inclusive approach:

- Implement non-binding 'climate risk-lite' frameworks.
- Support resilience-linked bonds via IFI guarantees.
- Integrate vulnerability metrics into credit assessments.
- Use IMF and WB programmes to build ICAAP capacity.

References: Figure 6, Section 3.6, Table 4

5.5. Cross-cutting priorities – embed equity, interoperability and institutional readiness

All country groups must integrate Just Transition considerations into prudential regulation. This includes adjusting green asset definitions to incorporate social co-benefits (e.g., job creation, access to services) and calibrating capital charges for MSME and rural climate lending accordingly.

Mandate that regulated financial institutions assign board-level responsibility for climate risk, supported by internal scenario design capacity and audit mechanisms. These requirements should be phased by asset size and aligned with corporate governance reform timelines.

Encourage global interoperability of climate-related financial data through shared taxonomies, aligned disclosure templates (e.g., ISSB, TCFD) and open-access climate scenario repositories. This will ease compliance burdens and unlock scalable cross-border investment vehicles.

Institutional mandates should be revised to explicitly include climate financial risk. Where central banks operate under single mandates, financial stability functions should be transferred to or coordinated with separate committees to avoid trade-offs between price stability and climate objectives.

Ensure all frameworks support equity and risk transparency:

- Align risk weights with MSME and rural green lending.
- Require board-level climate governance structures.
- Ensure global interoperability in taxonomies and disclosures.
- Expand mandates to include climate-systemic risks.

References: Section 2.1, Section 3.4, Table 1

6. Conclusion: recalibrating macroprudential policy to deliver climate-resilient investment in developing economies

This report has shown that climate-related risks – both physical and transition – are increasingly material to financial stability, and yet macroprudential regulation, as currently designed, is not equipped to address them. EMDEs, particularly LDCs and SIDS, are caught in a double bind: they are highly exposed to climate shocks while facing some of the highest regulatory and financial barriers to green investment.

Despite growing global momentum on sustainable finance, the current macroprudential architecture – especially the implementation of Basel III – fails to sufficiently integrate climate risk or differentiate between countries based on vulnerability and institutional capacity. This leads to two major distortions. First, capital costs remain high for climate-vulnerable countries due to rigid sovereign risk weightings, disincentivising urgently needed investment in adaptation and resilience. Second, financial institutions are not systematically incentivised to shift capital away from high-carbon sectors toward sustainable alternatives.

Drawing on our cross-country analysis of 40 jurisdictions, we offer the following five priority areas for policy action:

1. Embed climate vulnerability into international regulatory standards

Global standard-setting bodies, including the Basel Committee on Banking Supervision (BCBS), should initiate workstreams to integrate climate-related risks and vulnerability indices into capital adequacy frameworks. Adjusting risk weights for sovereign and green assets in climate-vulnerable countries would reduce regulatory barriers to investment in SIDS and LDCs without compromising prudential soundness.

2. Strengthen green macroprudential toolkits at the national level

Central banks and financial supervisors in EMDEs should be supported in adapting Basel III instruments to national climate contexts. This includes:

- Introducing “brown penalising” and, where appropriate, “green supporting” factors.
- Expanding the eligibility of HQLAs to include certified green instruments.
- Conducting climate stress testing under adverse scenarios.

These adaptations must be grounded in robust climate risk data and tailored to local institutional capacity.

3. Expand climate risk supervision and disclosures

Governments and regulators should mandate climate-related financial disclosures across banking and non-banking institutions, aligned with the TCFD and ISSB frameworks. At the same time, supervisory authorities must build internal capacity to assess and monitor climate risk through scenario analysis and forward-looking risk assessments. The integration of climate risks into supervisory dialogue should become standard practice.

4. Address just transition risks through targeted financial inclusion measures

Macroprudential regulations must avoid unintentionally excluding vulnerable firms, households and regions from finance. Policymakers should introduce climate-aligned credit guidance tools that include safeguards for MSMEs and labour-intensive sectors, alongside social impact scoring mechanisms that prioritise investments with co-benefits for livelihoods, inclusion and local resilience.

5. Align climate finance architecture with domestic financial systems

International climate funds, MDBs and donor institutions should simplify access procedures and channel more finance through domestic financial institutions. In parallel, capacity-building programmes should support the development of national green taxonomies, pipeline preparation facilities and technical tools to ensure that climate finance reaches where it is most needed and can be most effective.

Together, these measures outline a path toward a climate-aligned macroprudential regime that enables – not impedes – investment in sustainable development. A differentiated approach, sensitive to institutional constraints and investment needs across countries, is not only more just but also more effective in building financial resilience.

The role of policymakers is now clear:

- Regulators must move from climate awareness to climate action at the core of financial policy.
- International institutions must adapt their standards and funding strategies to reflect real-world risks and country-specific needs.
- Governments must ensure that climate financial regulation supports development objectives, not just financial stability.

Without targeted reform, capital will continue to bypass the economies that need it most – placing both climate goals and financial systems at risk. The opportunity now is to use macroprudential regulation as a lever to unlock green investment at scale, advance a just transition and fortify the financial foundations of a low-carbon future.

While this report has highlighted the progress and diversity of green macroprudential policies across countries, it also underscores persistent asymmetries in supervisory capacity and data readiness. The survey component (**Section 3.5**) reinforces these empirical findings: that without harmonised disclosure standards, proportionate capital frameworks and targeted support for supervisory capacity, green macroprudential regulation risks remaining an aspirational agenda rather than an operational reality. Future initiatives should therefore prioritise practical coordination channels between regulators, financial institutions and international bodies to ensure that prudential frameworks evolve in line with both climate and development objectives.

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Appendix 1. List of acronyms

Acronym	Expanded version
ADB	Asian Development Bank
AMA	Advanced Measurement Approaches
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
CAT bonds	Catastrophe Bonds
CBRC	China Banking Regulatory Commission
CDA	Central Depository of Armenia
CO_2	Carbon Dioxide
CRFPs	Climate-Related Financial Policies
CSRD	Corporate Sustainability Reporting Directive
DFIs	Development Finance Institutions
DNB	De Nederlandsche Bank
ECB	European Central Bank
EIOPA	European Insurance and Occupational Pensions Authority
EMDEs	Emerging and Developing Economies
ESG	Environmental, Social, and Governance
EU	European Union
FSB	Financial Stability Board
GCA	Green Credit Allocation Policies
GB	Green Bonds
GCF	Green Climate Fund
GDP	Gross Domestic Product
GFG	Green Financial Guidelines
GHG	Greenhouse Gas
GIF	Global Infrastructure Facility
GPP	Green Prudential Regulation
GSF	Green Supporting Factor
HICs	High-Income Countries
HQLA	High-Quality Liquid Assets
ICAAP	Internal Capital Adequacy Assessment Processes
ICC	International Chamber of Commerce
ICT	Information and Communication Technology
IFC	International Finance Corporation
IFIs	International Financial Institutions
IMF	International Monetary Fund
IRB	Internal Ratings-Based
ISSB	International Sustainability Standards Board
LCR	Liquidity Coverage Ratio
LDCs	Least Developed Countries
LMICs	Lower-Middle-Income Countries
MDBs	Multilateral Development Banks
MSMEs	Micro, Small, and Medium-sized Enterprises
ND-GAIN	Notre Dame Global Adaptation Initiative
NGFS	Network for Greening the Financial System
NSFR	Net Stable Funding Ratio
ODA	Official Development Assistance
OGD	Other Green Disclosure Requirements
OECD	Organisation for Economic Co-operation and Development
PD	Probability of Default
PBoC	People's Bank of China
RWA	Risk-Weighted Assets
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SME	Small and Medium Enterprise
TCFD	Task Force on Climate-related Financial Disclosures
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP FI	United Nations Environment Programme Finance Initiative
UMICs	Upper-Middle-Income Countries
VaR	Value at Risk

Appendix 2. List of figures

Appendix 3. List of tables

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