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Insight: Aligning Climate Finance with the Paris Agreement: Cooperative Approaches and the Transition from CDM to Article 6.4

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Abstract

This paper examines the evolution of climate finance under the UNFCCC, with particular attention to the transition from the Clean Development Mechanism (CDM) to Article 6.4 of the Paris Agreement. It situates climate finance within the theoretical frameworks of global public goods, distributive justice, and political economy, while aligning the analysis with the latest findings of the Intergovernmental Panel on Climate Change (IPCC). The discussion highlights persistent shortfalls in climate finance, the debt-heavy structure of current flows, and the challenges of mobilizing private capital. Cooperative approaches under Article 6 are assessed as both an opportunity and a risk, with implications for equity, integrity, and systemic transformation. The paper concludes with policy recommendations and a future research agenda.

1. Introduction

The Paris Agreement, adopted in 2015, marked a decisive shift in international climate governance. Unlike the Kyoto Protocol, which imposed binding emission reduction targets on a limited group of industrialized countries, the Paris Agreement established a universal framework in which all Parties submit Nationally Determined Contributions (NDCs). Central to this framework is the ambitious goal of limiting global warming to 1.5°C above pre-industrial levels (UNFCCC, 2016). Achieving this target requires not only enhanced mitigation and adaptation efforts but also a fundamental transformation of global financial flows. Article 2.1c of the Paris Agreement explicitly calls for aligning all financial flows with climate-compatible pathways, thereby moving beyond the traditional donor-recipient model of climate finance toward systemic change in the global economy (IPCC, 2023).

At COP15 in Copenhagen (2009), developed countries pledged to mobilize USD 100 billion annually by 2020 to support developing countries in their climate efforts (UNFCCC, 2010). This commitment was later extended through 2025 at COP21 in Paris, with Parties agreeing to establish a New Collective Quantified Goal (NCQG) prior to that time (UNFCCC, 2016). Yet, despite repeated assurances, the USD 100 billion target has not been consistently met, and questions remain about both the quantity and quality of climate finance delivered. Much of the finance has been provided in the form of loans rather than grants, raising concerns about debt sustainability in climate-vulnerable economies (OECD, 2022; IMF, 2022a).

2. Climate Finance under the UNFCCC

Climate finance has been a central pillar of international climate negotiations since the early years of the UNFCCC. The recognition that developing countries face disproportionate impacts from climate change, while often lacking the resources to respond, led to commitments by developed countries to provide financial support. The Copenhagen Accord (2009) pledged USD 30 billion in “fast start” finance between 2010 and 2012, followed by the USD 100 billion annual goal by 2020. This pledge was formalized in the Cancun Agreements at COP16 (2010) and later extended through 2025 at COP21 in Paris (UNFCCC, 2016).

Despite these commitments, delivery has consistently fallen short. The Glasgow Climate Pact at COP26 (2021) acknowledged with “deep regret” that developed countries had failed to meet the USD 100 billion goal by 2020 (UNFCCC, 2021). Subsequent delivery plans prepared by Canada and Germany projected that the goal would be achieved in 2023, but these plans lacked detail on individual country contributions and did not address qualitative aspects of finance such as the balance between loans and grants (COP26 Presidency, 2021; ECCC & Federal Foreign Office, 2022). Independent assessments have highlighted persistent gaps, noting that the USD 100 billion goal lacked clear accounting methodologies and definitions, making it difficult to measure flows or assess whether they addressed developing countries’ needs (SCF, 2022).

3. Matching Climate Financial Flows with Paris Agreement Goals

Between 2019 and 2020, climate finance flows reached approximately USD 632 billion. By 2023, flows had increased to roughly USD 1.3 trillion (Climate Policy Initiative, 2023). Yet estimates suggest that USD 5–7 trillion annually is needed to achieve the 1.5°C pathway, underscoring a massive shortfall (IPCC, 2023). The IPCC emphasizes that this gap reflects not only insufficient mobilization but also structural misalignment between current flows and the systemic transformation required.

Loans accounted for 71 percent of finance mobilized toward the USD 100 billion goal, while grants represented only 26 percent (OECD, 2022). Nearly 60 percent of the lowest-income economies are already in or at high risk of debt distress (IMF, 2022a). Delivering climate finance primarily through loans risks exacerbating debt burdens rather than alleviating them, raising questions about the sustainability of current financing models. Public actors have borne most of the burden of climate finance. Between 2019 and 2020, governments committed an annual average of USD 321 billion, representing 51 percent of total flows. Multilateral Climate Funds raised USD 3.5 billion, largely from the Green Climate Fund (GCF) and the Global Environment Facility (GEF). The World Bank Group delivered a record USD 42.6 billion in climate finance in fiscal year 2024 (World Bank, 2024).

Private sector contributions remain limited, particularly in adaptation. The IPCC (2023) stresses that private finance has been concentrated in mitigation projects with clearer revenue streams, while adaptation remains underfunded. Without stronger private sector engagement, public finance alone cannot close the gap. This raises the question of whether cooperative approaches under Article 6 represent a viable alternative for mobilizing private finance.

Table 1. Climate Finance Flows, Targets, and NCQG Context

Year / Target	Climate Finance Flows (USD)	Notes
2019–2020 (average annual)	632 billion	Public actors are dominant (51% governments); private sector limited, esp. in adaptation.
2023	1.3 trillion	Growth in flows; World Bank delivered 42.6 billion; still far below needs.
Paris Agreement needs (annual)	5–7 trillion	IPCC estimate for 1.5°C pathway; reflects systemic transformation required.
USD 100 billion pledge (goal)	100 billion	Loans: 71%; Grants: 26%; debt-heavy structure problematic for vulnerable economies.
NCQG (post-2025, under negotiation)	TBD (expected to exceed 100 billion)	Negotiations ongoing; expected to reflect higher ambition, broader scope (mitigation, adaptation, loss & damage); equity and burden-sharing central issues.

Source: Information gathered from - Climate Policy Initiative (2023, 2024); Intergovernmental Panel on Climate Change (2023); OECD (2022, 2024); International Monetary Fund (2021, 2022a, 2022b); World Bank Group (2024); UNFCCC COP Decisions (2010, 2016, 2021, 2025).

The NCQG is crucial because it will replace the USD 100 billion pledge after 2025. While the exact figure is still under negotiation, it is expected to exceed USD 100 billion and incorporate broader dimensions of climate finance, including adaptation and potentially loss and damage. The IPCC (2023) emphasizes that the NCQG must not only scale up ambition but also address structural issues such as debt sustainability, equity, and systemic transformation of financial flows. Including the NCQG in your charts and tables signals that climate finance debates are evolving beyond the donor-recipient model toward a more comprehensive framework of global responsibility.

4. Cooperative Approaches under Article 6

Article 6 of the Paris Agreement establishes the framework for cooperative mechanisms that enable Parties to use international carbon market instruments to achieve their nationally determined contributions (NDCs). These mechanisms include the bilateral transfer of internationally transferred mitigation outcomes (ITMOs) under Article 6.2 and the centralized Paris Agreement Crediting Mechanism (PACM) under Article 6.4. Both provisions are built on existing carbon market structures, such as emissions trading schemes (ETs) and crediting schemes, but require

enhanced safeguards to ensure environmental integrity. As Schneider and La Hoz Theuer (2019) argue, cooperative mechanisms must not result in an increase in global emissions compared to a scenario without such cooperation, which underscores the importance of unit quality. Broekhoff and Spalding-Fecher (2021) highlight that assessing the quality of credits is a complex undertaking involving institutions, methodologies, and mitigation activities, and that robust standards and practices are essential to ensure that credits represent additional, permanent, and verifiable emission reductions.

Studies suggest that cooperative approaches could save Parties more than USD 300 billion annually by 2030 through efficiency gains (University of Maryland & Pacific Northwest National Laboratory, 2022). However, the IPCC (2023) cautions that while cooperative approaches can reduce costs and mobilize private capital, they are not a substitute for scaled-up public finance. The Panel emphasizes that carbon markets must be designed to safeguard environmental integrity, ensure equitable distribution of benefits, and avoid undermining ambition. Cooperative approaches may help attract private investment, but they cannot resolve structural financing gaps in adaptation or address debt sustainability challenges.

5. Transition from CDM to Article 6.4

The Clean Development Mechanism (CDM), established under the Kyoto Protocol, was the first large-scale experiment in project-based carbon finance. It mobilized billions in investment and created a framework for certifying emission reductions, but it also faced persistent criticisms. Scholars have noted weaknesses in additionality testing, risks of over-crediting, and the uneven distribution of projects, with most concentrated in emerging economies such as China, India, and Brazil, while least developed countries received relatively little investment (Mustapha, 2022). These shortcomings raised questions about both environmental integrity and equity, undermining confidence in the mechanism's ability to deliver genuine climate benefits across all regions.

Recognizing both the value and limitations of the CDM, Parties to the Paris Agreement agreed to establish a new mechanism under Article 6.4. This mechanism—formally called the Paris Agreement Crediting Mechanism (PACM)—was designed to replace the CDM with stricter rules on baselines, additionality, and monitoring. Successive COP decisions have gradually operationalized Article 6.4: COP26 in Glasgow (2021) adopted the Article 6 Rulebook, COP27 clarified procedures for the Supervisory Body and registry operations, COP28 advanced methodological guidance, COP29 strengthened standards for baselines and leakage, and COP30 in Belém (2025) fully operationalized the PACM (UNFCCC, 2021; UNFCCC, 2025). The transition reflects a deliberate effort to retain the useful infrastructure of carbon markets while addressing integrity concerns. For developing countries, Article 6.4 offers opportunities to access finance and support Sustainable Development Goals, but also presents challenges related to governance, institutional capacity, and equitable participation.

6. Implications for Developing Countries

For developing countries, cooperative approaches under Article 6 offer both promise and risk. On the one hand, they provide access to new finance streams through tradable credits and co-benefits aligned with Sustainable Development Goals, such as improved sanitation, clean energy access, and biodiversity protection (World Bank, 2024). They also diversify finance sources beyond debt-heavy instruments. On the other hand, governance and institutional capacity gaps may limit participation, while stringent requirements for monitoring, reporting, and verification demand technical expertise. Without adequate capacity-building support, many vulnerable countries risk exclusion from these mechanisms.

Equity considerations remain central. Mechanisms like the “share of proceeds” provision are designed to channel a portion of revenues toward adaptation in vulnerable countries. However, effectiveness depends on implementation and scale. Additionality requirements can also disadvantage countries where mitigation activities are already underway, limiting their ability to generate credits (OECD, 2024). The IPCC (2023) underscores that cooperative approaches must be embedded within a broader framework of distributive justice, ensuring that vulnerable countries benefit equitably from carbon markets.

7. Conclusions and Policy Recommendations

Climate finance and carbon markets are indispensable for achieving the Paris Agreement’s 1.5°C goal. Yet, global flows remain far below the trillions required, and debt-heavy structures pose risks for vulnerable economies (IMF, 2022a; Climate Policy Initiative, 2023). The IPCC (2023) stresses that the alignment of financial flows with climate-compatible pathways is not simply a matter of scaling up existing commitments but requires a systemic transformation of global financial markets. This transformation involves shifting incentives, reforming debt structures, and embedding equity considerations into the architecture of climate finance.

The transition from the CDM to Article 6.4 represents both continuity and reform. While the CDM mobilized investment and built technical capacity, it faced criticisms of integrity and equity. Article 6.4 seeks to address these shortcomings through stricter rules, standardized methodologies, and enhanced governance (UNFCCC, 2025). However, the IPCC cautions that cooperative approaches, while potentially mobilizing private capital and reducing costs, cannot substitute for scaled-up public finance. They must be embedded within a broader framework of distributive justice and systemic reform.

Policy recommendations therefore include scaling up public finance beyond the USD 100 billion pledge, shifting toward grants and concessional finance to reduce debt burdens, and mobilizing private capital through clear rules and incentives under Article 6. Safeguarding environmental integrity requires robust methodologies and independent verification, while equity must be promoted by ensuring vulnerable countries benefit from adaptation revenues and fair access to carbon markets. Ultimately, aligning climate financial flows with the Paris Agreement requires a multi-pronged strategy that combines scaled-up public finance, mobilized private capital, reformed debt structures, and credible carbon markets.

8. Future Research

Future research should explore the role of blended finance models in bridging the gap between public and private flows, particularly for adaptation projects that lack clear revenue streams. Debt-for-climate swaps and other innovative instruments deserve closer examination as mechanisms to address debt sustainability while mobilizing climate finance. The governance of Article 6.4 also requires sustained scholarly attention, particularly regarding equity and integrity in crediting methodologies.

Another critical area of inquiry is the political economy of the New Collective Quantified Goal (NCQG). Research should investigate how distributive justice and burden-sharing are negotiated in the establishment of new targets, and how these negotiations reflect broader dynamics of global inequality. Finally, the drivers and barriers to private sector engagement in adaptation finance remain poorly understood. The IPCC (2023) highlights that private finance has been concentrated in mitigation, leaving adaptation underfunded. Understanding the incentives, risks, and institutional arrangements that could shift private capital toward resilience-building is essential for closing the financing gap.

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