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Scoping Paper

Developing a Chinese Ecosystem Compliant Green Financing Framework in Pakistan

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Abbreviations and Acronyms

BOC	Bank of China
BRI	Belt and Road Initiative
CDB	China Development Bank
CCICED	China Council for International Cooperation on Environment and Development
CPEC	China-Pakistan Economic Corridor
EBRD	European Bank for Reconstruction and Development
ESG	Environmental, Social, and Governance
ETMs	Energy Transition Mechanisms
GIFP	Green Innovation Financing Platform
GNI	Gross National Income
ICBC	Industrial and Commercial Bank of China
IMF	International Monetary Fund
JETPs	Just Energy Transition Partnerships
LIBOR	London Interbank Offered Rate
NDCs	Nationally Determined Contributions
PBoC	People's Bank of China
PRC	People's Republic of China
PRGs	Partial Risk Guarantees
RMB	Renminbi (Chinese Currency)
SHIBOR	Shanghai Interbank Offered Rate
SLBs	Sustainability-Linked Bonds
USD	United States Dollar
WB	World Bank


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EXECUTIVE SUMMARY

This report presents a comprehensive evaluation of Pakistan's deepening financial entanglement with China, emphasizing the fiscal, debt, and investment dimensions of the bilateral relationship, particularly under the framework of the China-Pakistan Economic Corridor (CPEC). As of fiscal year 2023–24, Pakistan's total external debt reached $130.85 billion, with China alone accounting for approximately $28.79 billion, 22% of the total, making it the country's single largest bilateral creditor. Chinese financing is composed primarily of two components: roughly $21.39 billion in concessional government-to-government loans, and approximately $3.5 billion in high-interest, short-tenor commercial loans sourced from Chinese financial institutions such as the China Development Bank, ICBC, and the Bank of China. These commercial loans are frequently pegged to floating interest benchmarks like LIBOR and SHIBOR, amplifying the risks posed by global financial volatility. As a result, debt servicing has become a critical fiscal challenge for Pakistan, which paid $666.7 million to China in FY 2023–24, including $420 million in interest alone. The growing reliance on short-term loan rollovers and repeated refinancing of expensive commercial debt underscores the urgency of addressing Pakistan's debt sustainability and exposure to external shocks.

The report offers a detailed roadmap for rethinking Pakistan's financial architecture through a mix of traditional and innovative instruments aimed at restructuring debt, reducing reliance on carbon-intensive infrastructure, and enabling climate-aligned investments. Among the key recommendations is the adoption of Debt-for-Nature, Debt-for-Climate, and Debt-for-Carbon swaps, whereby portions of Pakistan's debt—particularly loans linked to environmentally damaging coal projects—could be forgiven or restructured in exchange for verifiable climate mitigation and adaptation investments. These swaps could redirect billions of dollars from debt servicing toward vital environmental priorities like renewable energy, water management, reforestation, and disaster resilience.

Additionally, the report advocates for leveraging green bonds and Sustainability-Linked Bonds (SLBs) to refinance Pakistan's costly commercial debt. Unlike traditional loans, these instruments tie interest rates to the achievement of climate-related or development performance targets, offering both flexibility and accountability. Pakistan is urged to co-develop such instruments with Chinese financial institutions—such as through joint issuance of green bonds or SLBs—to attract global ESG capital while enhancing transparency and lowering borrowing costs. The expansion of Panda Bonds—RMB-denominated bonds issued by Pakistan in Chinese markets—represents another strategic avenue for diversification and cost reduction, particularly at a time of rising global dollar interest rates.

Furthermore, the report explores the use of Partial Risk Guarantees (PRGs) backed by multilateral institutions to de-risk Pakistan's investment environment. PRGs would make it easier to refinance high-interest Chinese loans by attracting private sector capital into clean infrastructure projects while offsetting political, regulatory, and currency risks. Complementary tools such as interest rate swaps and currency hedging instruments are recommended to stabilize debt servicing obligations, especially given the floating rate structure of much of the Chinese commercial debt.

To advance a sustainable energy transition while reducing fiscal stress, the report

introduces Managed Transition Vehicles (MTVs) and Energy Transition Mechanisms (ETMs). These blended finance structures combine concessional capital with private investment to fund the early retirement of coal-fired power plants—a major component of Pakistan's Chinese-financed energy infrastructure—and replace them with renewables. The strategic pivot is reinforced by the potential to monetize Transition Credits and carbon buyouts, transforming the avoided emissions from plant closures into financial assets that can be used to repay debt or attract new investment.

The analysis further highlights the strategic opportunity presented by China's own pivot toward green finance and decarbonization under the Belt and Road Initiative (BRI). China's growing leadership in global green lending, including recent issuances of green sovereign and carbon-neutral bonds, offers a timely and politically feasible pathway for Pakistan to engage China in bilateral debt reform aligned with mutual sustainability goals. Platforms like the Green Innovation Financing Platform (GIFP), backed by Chinese policy and commercial banks, are particularly well-suited to support Pakistan's restructuring needs through pipeline-ready climate infrastructure projects that meet green financing standards.

The findings of this report highlight the evolving nature of Pakistan's financial relationship with China, marked by a shift from infrastructure-focused investment to increasing debt dependency. With a significant portion of Pakistan's external debt now linked to short-term, high-cost borrowing from Chinese sources, particularly in sectors like coal-based energy, there is a growing fiscal burden that complicates economic planning and sustainability objectives. The report outlines a range of financing mechanisms that could be considered to manage this debt more effectively, including performance-based instruments, blended finance models, and climate-linked debt restructuring tools. Additionally, it examines how China's expanding role in global green finance may offer opportunities for Pakistan to negotiate more favorable terms and reorient a portion of its external obligations toward low-carbon development priorities. These approaches collectively provide insight into possible financial strategies that address both debt sustainability and climate-related infrastructure needs, within the broader context of bilateral economic cooperation.

Section I

Introduction

1.1 BACKGROUND

Over the past decade, Pakistan's economic landscape has become increasingly shaped by its strategic partnership with China, with the China-Pakistan Economic Corridor (CPEC) emerging as a flagship initiative under Beijing's broader Belt and Road vision. Positioned as a transformative framework, CPEC was envisioned to catalyze Pakistan's economic revival by addressing its long-standing infrastructure deficits, energy shortages, and connectivity challenges. In practice, this partnership has unlocked a wave of Chinese investments across critical sectors—most notably energy, transport, and technology—marking a significant shift in both the scale and structure of foreign capital inflows into the country.

From 2015 to 2024, Chinese investments flowed primarily into the energy sector, which absorbed 71% of total Chinese financing in Pakistan, followed by transport infrastructure with 23%, while the remaining funds supported technology, real estate, and financial services. These investments were instrumental in expanding Pakistan's power generation capacity, modernizing highways and ports, and laying the groundwork for industrial corridors. On the surface, this economic collaboration appeared to offer a win-win: Pakistan gained critical infrastructure, and China deepened its economic and geopolitical footprint in South Asia.

Beneath the surface, however, a different financial reality began to unfold. As of the fiscal year 2023–24, Pakistan's external debt had surged to $130.85 billion, with China accounting for approximately 22%—or $28.79 billion—of the total. This growing reliance on Chinese credit reflects a dual financing structure. The first component consists of roughly $21.39 billion in government-to-government loans, typically extended on concessional terms and earmarked for large-scale infrastructure and energy projects under CPEC. These loans, while long-tenure and relatively low-cost, carry repayment obligations that are now maturing in clusters, putting cumulative pressure on the fiscal system.

The second and increasingly concerning component is the $3.5 billion borrowed from Chinese commercial banks such as the China Development Bank, ICBC, and the Bank of China. Unlike sovereign lending, these loans are high-interest and short-term in nature, often tied to floating interest rate benchmarks like LIBOR or SHIBOR. The compressed repayment periods and expensive servicing costs associated with these commercial instruments have created a persistent cycle of refinancing and rollovers, heightening Pakistan's exposure to external shocks and currency volatility.

By FY 2023–24, Pakistan had allocated $666.7 million solely for debt servicing to China—of which $420 million was for interest payments. These represent an increasingly binding constraint on Pakistan's fiscal flexibility. As more of the national budget is redirected toward

Chinese investments flowed primarily into the **energy sector, which absorbed 71% of total Chinese financing in Pakistan.**

external debt obligations, the space for social spending, development financing, and macroeconomic stabilization continues to shrink. The short-term, variable-rate structure of much of the commercial borrowing further compounds the problem, exposing Pakistan to rising global interest rates and currency depreciation risks. This rising debt burden has also clashed with Pakistan's long-term developmental needs. Many of the Chinese-financed energy projects, particularly coal-fired plants, are not only financially draining due to overcapacity and low tariff recoveries, but they are also environmentally incompatible with Pakistan's international climate commitments. As global momentum shifts toward sustainable finance, Pakistan finds itself encumbered by legacy liabilities that are both expensive and carbon intensive.

In this context, the challenge facing Pakistan is not simply how to repay what it owes, but how to rethink its entire financing model. Traditional debt-heavy approaches, especially those tied to high-cost and short-term instruments, are proving inadequate, and in many cases, counterproductive, for addressing the country's dual crisis of fiscal fragility and climate vulnerability.

Figure 1: Pakistan's CPEC Crossroads

What is emerging instead is the growing need for non-debt-creating financial instruments, tools that allow Pakistan to finance its development and climate goals without further increasing its external debt stock. Mechanisms such as debt-for-nature swaps, green and sustainability-linked bonds, carbon buyouts, and blended finance vehicles represent strategic alternatives. These instruments can convert existing obligations into results-based frameworks, attract climate-aligned capital, and reduce the dependence on expensive commercial borrowing. Furthermore, models like Just Energy Transition Partnerships (JETPs) and transition credits offer structured pathways to retire carbon-intensive assets while mobilizing concessional finance.

At a time when China itself is transitioning into a global leader in green finance, issuing sovereign green bonds and investing in climate-smart infrastructure across the Global South, there is a strategic opening for Pakistan to recalibrate its financial relationship with its largest creditor. As the debt service obligations to China escalate, so too does the need to reassess the sustainability of this financial relationship and explore mechanisms that could stabilize Pakistan's external position while supporting long-term economic and environmental objectives.

1.2
SCOPE, OBJECTIVES, AND METHODOLOGICAL APPROACH

This report examines Pakistan's external debt structure with a specific focus on its financial obligations to China, particularly in relation to energy sector investments under the China-Pakistan Economic Corridor (CPEC). Given that a significant proportion of Chinese financing has been directed toward coal-based and other energy infrastructure projects, the report focuses on the fiscal implications of this debt and its alignment with Pakistan's long-term development and climate objectives. The scope is centered on identifying and evaluating financing instruments that can help manage these obligations more effectively while supporting a transition toward cleaner, more sustainable energy systems.

The analysis is directed toward financing solutions that mitigate the macroeconomic and environmental risks associated with high-cost, short-tenor debt, especially loans tied to coal-based energy infrastructure. The report concentrates on non-debt-creating or blended instruments, including but not limited to debt-for-climate and debt-for-carbon swaps, green and sustainability-linked bonds (SLBs), Just Energy Transition Partnerships (JETPs), transition credits, and carbon buyouts. These instruments are assessed for their potential to simultaneously reduce fiscal stress, support the early retirement of carbon-intensive assets, and unlock capital for clean energy alternatives.

In focusing on the intersection of debt sustainability, energy sector financing, and climate policy, this report aims to support a structured evaluation of viable financial pathways for Pakistan. It considers how alternative instruments can be adapted to the country's existing debt profile and institutional capacities, with particular attention to the energy sector's role in driving both fiscal exposure and environmental impact.

Key Objectives of the report includes

- **Evaluate the structure and fiscal impact** of Chinese debt, both concessional and commercial, on Pakistan's macroeconomic stability, with an emphasis on short-term rollover risk, interest obligations, and climate misalignment.
- **Identify non-debt-creating and blended finance instruments** that offer viable alternatives to traditional borrowing, such as debt-for-climate swaps, green and sustainability-linked bonds (SLBs), carbon buyouts, and transition credits.
- **Analyze the feasibility and strategic value** of deploying performance-based and market-aligned instruments, including, Hedging Instruments, Energy Transition Mechanisms (ETMs), Panda Bonds, and Partial Risk Guarantees (PRGs), in the Pakistan-China context.
- **Prioritize financing solutions** that offer both fiscal relief and environmental benefit, enabling Pakistan to exit the cycle of high-cost commercial borrowing and move toward a more resilient and climate-compatible financing model.

This study employs a mixed-methods approach, combining quantitative debt analysis with qualitative assessment of financial instruments. Quantitative data were collected from official sources including the Pakistan Economic Survey, Ministry of Finance, State Bank of Pakistan, World Bank, and the China Global

Investment Tracker. These data were used to examine the structure, terms, and sectoral allocation of Pakistan's debt to China, with a particular focus on energy sector financing under CPEC.

The qualitative component involved reviewing policy documents, academic literature, and global case studies to evaluate the relevance and feasibility of alternative instruments such as debt-for-climate swaps, green and sustainability-linked bonds, and energy transition mechanisms. Comparative insights from countries with similar financial engagements helped contextualize Pakistan's options. This integrated approach supports a comprehensive understanding of both the fiscal risks and the strategic pathways available for sustainable debt management and climate-aligned financing.

Figure 2: *Conceptual Flow of Study*

Section II

Analytical Overview of Pakistan Investment & Debt Profile with China

China has emerged as Pakistan's largest economic and investment partner, playing a transformative role in infrastructure development, energy security, and industrial expansion. The partnership, primarily driven under the China-Pakistan Economic Corridor (CPEC).

2.1. SECTOR-WISE CHINESE INVESTMENT IN PAKISTAN

China has been a key economic partner for Pakistan, channeling substantial investments into critical sectors that drive economic growth, infrastructure development, and industrial modernization. The sector-wise distribution of Chinese investments reveals a strong emphasis on energy, transport, and technology, aligning with Pakistan's long-term strategic needs under the China-Pakistan Economic Corridor (CPEC). The following table presents a detailed breakdown of sector-wise Chinese investments from 2015 – 2024 in Pakistan, highlighting total investment amounts and percentage shares for each sector.

Table 1: Sector-wise Chinese Investment

Sector	Investment (M USD)	Percentage Share (%)
Energy	28070	71.35231
Financial	180	0.45755
Metals	130	0.330452
Real Estate	690	1.75394
Technology	720	1.830198
Utilities	650	1.652262
Transport	8900	22.62328

Source: Chinese Investment Tracker

2.2 OVERVIEW OF PAKISTAN'S DEBT PROFILE

Pakistan's external debt in FY 2023 – 24 stood at $130.85 billion, reflecting a significant reliance on both multilateral and bilateral creditors. The country's external debt stocks were 39% of its Gross National Income (GNI) and 352% of its exports, underscoring the mounting financial pressures. Debt servicing accounted for 43% of exports and 5% of GNI.

China emerged as the single largest creditor, holding 22% of Pakistan's total external debt, which amounts to approximately $28.79 billion. Other significant creditors included World Bank-IDA (18%), Asian Development Bank (15%), and other multilateral institutions (13%). Bilateral lenders, including Saudi Arabia and other nations, accounted for 45% of the total debt. Private creditors such as bondholders (8%) and commercial banks (1%) also had a presence in Pakistan's debt portfolio. Pakistan's total external debt stocks increased from $127.7 billion to $130.85 billion in last couple of years. The country's net financial flows stood at $5.05 billion, with net debt inflows of $3.3 billion and net equity inflows of $1.75 billion. The use of IMF credit and SDR allocations reached $11.53 billion in 2023.

Table 2: Debt Composition Summary FY 2023 - 2024

Category	Value (US$ Billion)	Share (%)
Total External Debt Stocks	130.85	100%
Multilateral Creditors	46.1	46%
- World Bank-IDA	23.55	18%
- Asian Development Bank	19.63	15%
Bilateral Creditors	45.66	45%
- China	28.79	22%
- Saudi Arabia	9.16	7%
- Other Bilateral Lenders	7.71	8%
Private Creditors	11.78	9%
- Bondholders	10.47	8%
- Commercial Banks & Others	1.31	1%

Source: World Bank Debt Report

Pakistan's long-term interest payments surged to $4.33 billion in 2023, compared to $3.20 billion in 2022, indicating rising costs of borrowing. Principal repayments for long-term debt also increased to $9.67 billion.

2.3. PAKISTAN'S DEBT TO CHINA

China remains Pakistan's largest bilateral creditor, with outstanding public and publicly guaranteed debt amounting to $14.89 billion as of March 31, 2024. This accounts for a dominant share of Pakistan's Non-Paris Club bilateral debt, reinforcing the country's financial dependence on Chinese credit.

Pakistan's debt to China falls under the Non-Paris Club Countries category, which collectively holds $16.39 billion in outstanding debt. China alone accounts for $14.89 billion, representing 91% of the total Non-Paris Club debt.

Table 3: Pakistan's Bilateral Debt		
Creditor	**Debt Outstanding (US$ Billion)**	**Share (%)**
Paris Club Countries	7.22	18.7%
Non-Paris Club Countries	16.39	42.4%
Commercial Banks & SAFE/ Deposits	6.06	15.7%
China (Government Loans)	14.89	39% of Bilateral Debt and 91% of Non-Paris Club Debt
Total Bilateral Debt Over all	38.67	100%
Source: Pakistan Economic Survey		

2.3.1 Breakdown of Pakistan's Debt from China and Chinese Banks

Pakistan's financial exposure to China and Chinese financial institutions remains a critical aspect of its external debt portfolio. The country's debt obligations to China include government loans and commercial borrowings from key Chinese banks such as Bank of China, China Development Bank, and ICBC China. As of March 2024, Pakistan's total outstanding debt to China, including government loans and commercial bank borrowings, has reached $24.89 billion. This figure highlights Pakistan's increasing reliance on China for financial support, especially for infrastructure projects, budgetary assistance, and balance of payments stabilization.

A significant portion of these loans is attributed to government-to-government lending, amounting to $21.39 billion. In addition, Pakistan has borrowed $3.5 billion from Chinese commercial banks, including Bank of China, China Development Bank, and ICBC China, to meet immediate financing needs. These loans typically have short amortization periods (2-3 years) and high interest rates linked to LIBOR and SHIBOR benchmarks, making them expensive and difficult to service.

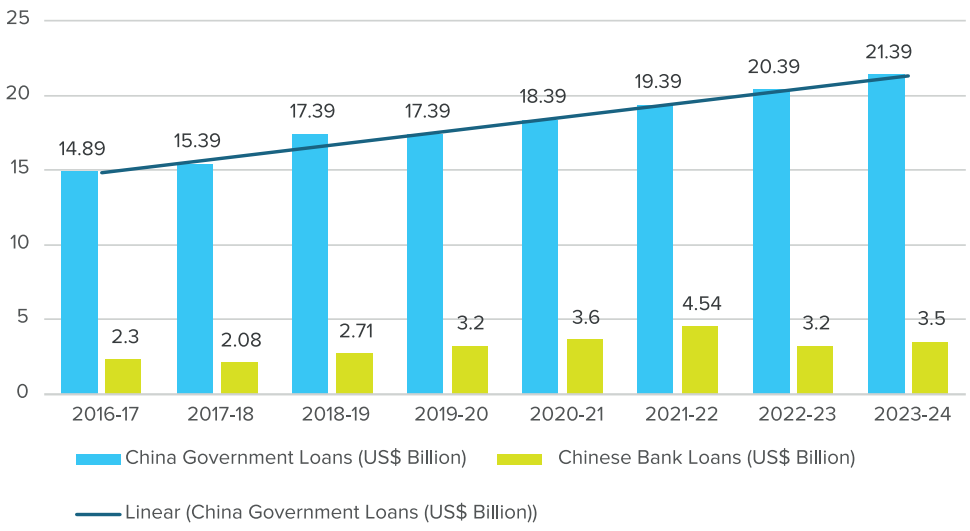


Figure 3: Year Pakistan's Total Debt Exposure to China 2016-2024 (Source Pakistan Economic Survey)

Pakistan has been rolling over its Chinese loans annually to avoid immediate repayments, further increasing its dependency on short-term refinancing. The rising cost of debt servicing, particularly interest payments of $420 million to China in 2023-24, poses serious financial challenges.

Pakistan's total debt to China can be divided into two key categories: government-to-government loans and commercial borrowings. Government loans, acquired under bilateral agreements, often come with relatively longer repayment periods. However, commercial bank borrowings from Bank of China, China Development Bank, and ICBC China are short-term, expensive, and require frequent refinancing.

A. Government-to-Government Loans

These loans represent Pakistan's direct obligations to the Chinese government. They are primarily used for infrastructure projects, budgetary support, and balance of payments assistance. The table below highlights the historical trends of Pakistan's government borrowing from China over the past eight years.

Table 4: Government-to-Government Loans (Non-Paris Club)

Fiscal Year	Amount Contracted (US$ Million)	Interest Rate	Amortization Period (Years)
2016-17	729.4	Fixed 2% & LIBOR 6M + 2.8%	20
2017-18	500.0	LIBOR 12M + 1%	2
2018-19	2,000.0	LIBOR 12M + 1%	1
2019-20	0.0	-	-
2020-21	1,000.0	LIBOR 12M + 1%	1
2021-22	1,000.0	LIBOR 12M + 1%	1
2022-23	1,000.0	Fixed 3.8%	2
2023-24 (March)	1,000.0	LIBOR 12M + 1%	-

Source: Pakistan Economic Survey

B. Commercial Borrowings from Chinese Banks

In addition to government loans, Pakistan has taken significant commercial loans from Chinese banks, particularly Bank of China, China Development Bank, and ICBC China. These loans are short-term, high-interest, and often used for immediate liquidity needs, including budgetary support and foreign exchange stabilization.

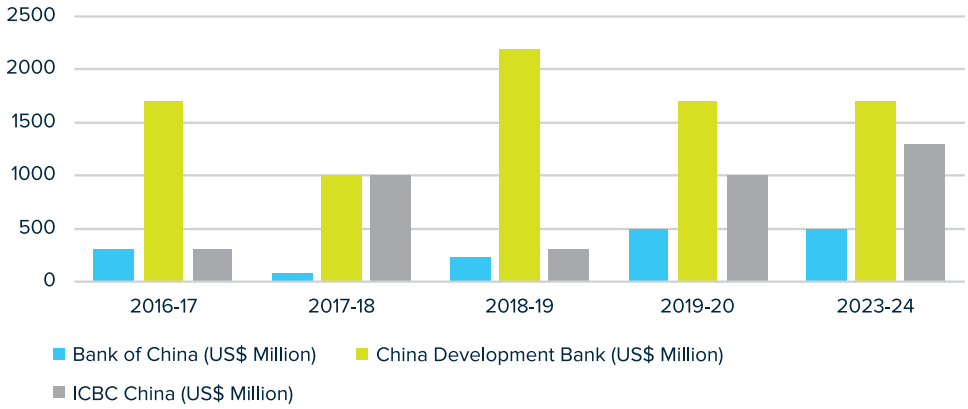


Figure 4: Commercial Borrowing from Chinese Banks (Source: Pakistan Economic Survey)

2.4. PAKISTAN'S DEBT SERVICING TO CHINA (AS OF MARCH 2024)

China remains Pakistan's largest bilateral lender, and the country's debt servicing obligations to China have seen significant fluctuations over the years. As of March 2024, Pakistan has made substantial payments toward both principal repayments and interest on its outstanding debt to China.

For the fiscal year 2023-24 (March), Pakistan paid:

- $246.7 million in principal repayments.
- $420 million in interest payments.

This makes China the single largest recipient of Pakistan's bilateral debt servicing payments, reflecting its dominant role in Pakistan's external obligations.

Pakistan's payments to China have fluctuated over the past few years, with notable peaks in certain years. Below is a year-wise breakdown of Pakistan's payments to China:

Table 5: Historical Debt Servicing to China (2016-2024)

Fiscal Year	Principal (US$ Million)	Interest (US$ Million)	Total Debt (US$ Million)
2016-17	712.3	205.8	918.1
2017-18	216.1	240.3	456.4
2018-19	342.0	388.2	730.2
2019-20	421.6	450.8	872.4
2020-21	135.5	169.8	305.3
2021-22	394.4	240.3	634.7
2022-23	1,302.1	424.9	1,727.0
2023-24 (Mar)	246.7	420.0	666.7

Source: Pakistan Economic Survey

High debt servicing pressure

Pakistan's debt servicing to China: **$666.7 million** (24-2023)

$420 million in interest payments, highlighting costly loans.

Limits fiscal flexibility and diverts funds from development.

Short-Term Refinancing Risk

Reliance on **short-term loans** (3-1 years) with high interest.

Continuous **refinancing** cycles increase risk.

Exposure to global interest rates and currency fluctuations.

Costly Debt Structure

High interest rates on commercial loans.

Frequent **rollovers** make debt management unsustainable.

Burden on resources, restricting economic growth.

Proposed Solutions

Utilize **Debt-for-Nature swaps, JETPs**, and **ETMs** for sustainability.

Explore instruments and renegotiate terms with China for better refinancing.

Figure 5: Critical Challenges in Pakistan Debt Profile with China

Section III

China's Green Finance Ecosystem: Evolution, Expansion, and Emerging Frontiers

Over the past decade, China has reshaped its financial architecture to align with its climate ambitions—transitioning from fragmented pilot projects to a globally influential green finance ecosystem. This section outlines transformation across three key dimensions: evolution of the institutional model, market scaling and policy alignment, and instrumental innovation for climate impact.

3.1. EVOLUTION: FROM POLICY EXPERIMENTS TO GLOBAL STANDARD-SETTER (2013–2024)

China's green finance ecosystem did not emerge overnight, it has evolved through sustained state guidance, iterative policy learning, and adaptive regulation. What began as scattered green credit policies in the early 2010s has developed into one of the world's most comprehensive green finance regimes (Yue & Nedopil, 2025).

2013–2016: Laying the Groundwork

- The concept of "green finance" entered official discourse around 2013, with ¥4 trillion in green loans—mostly targeting pollution control and industrial upgrades.
- In 2016, the People's Bank of China (PBoC) issued its landmark Green Finance Guidelines, formalizing a national strategy and launching the green bond market.
- The Green Bond Endorsed Project Catalogue became China's first attempt to standardize green eligibility, with early issuances totaling ¥230 billion in 2016.

2017–2020: Framework Consolidation and Early Scaling

- By 2020, green loans exceeded ¥15.9 trillion, nearly quadrupling in seven years and comprising 10.3% of total banking credit.
- China introduced seven pilot carbon markets across major cities and provinces to prepare for national ETS implementation.
- Green bond issuance reached ¥365 billion in 2020, supported by strong state-owned financial institution participation.

2021–2022: Strategic Alignment with National Carbon Goals

- Following China's 2020 pledge to peak emissions by 2030 and achieve carbon neutrality by 2060, green finance became a strategic imperative.
- The national Emissions Trading System (ETS) officially launched in July 2021, initially covering over 2,200 power sector entities.
- In parallel, PBoC announced the Five Pillars of Green Finance: standard systems, regulation/disclosure, incentives, product/market development, and international cooperation.

2023–2024: Systemic Maturity and Global Positioning

- By 2024, green loans had reached ¥35.75 trillion, or 13.9% of total credit, while the cumulative green bond issuance approached ¥3 trillion.
- China relaunched its Certified Emission Reduction (CCER) market and issued national standards for carbon footprint accounting across 200 industrial sectors.
- The launch of the Common Ground Taxonomy (CGT) with the EU and Singapore marked China's ascension as a global rule-maker in sustainable finance.

The table below illustrates this 10-year progression, capturing the growth in lending, bond issuance, and market share.

Table 6: Evolution of Green Finance in China (2013–2024)

Year	Green Loans (¥ Trillion)	% of Total Loans	Green Bond Issuance (¥ Billion)	Major Milestone
2013	4.0	~5%	–	Green credit pilots in SOEs and development banks
2016	8.0	7.4%	230	PBoC issues Green Finance Guidelines
2018	9.54	9.3%	270	First taxonomy (Green Bond Catalogue) updated
2020	15.9	10.3%	365	National ETS pilots consolidated
2022	27.1	12.5%	540	Five Pillars of Green Finance introduced
2024	35.75	13.9%	850	CCER relaunched, CGT aligned with EU/Singapore

3.2. EXPANSION: SCALING FINANCE FOR CLIMATE-RESILIENT GROWTH

Between 2020 and 2024, China's green finance ecosystem entered a rapid scaling phase, driven by clearer policies, mandatory disclosures, and targeted incentives. Green loans grew by 19% year-on-year in 2024, reaching ¥35.75 trillion and channeling capital into priority sectors such as solar power, electric vehicle infrastructure, and industrial decarbonization. Green insurance saw exceptional growth, with total coverage surging from ¥70.9 trillion in 2023 to ¥469 trillion in 2024, while claims payouts rose by 77.8%, reflecting heightened climate risk awareness. The national Emissions Trading System (ETS) recorded ¥18.1 billion in trading volume during the year, with plans announced to expand coverage to high-emitting sectors like cement and steel by 2025. Simultaneously, green investment funds rebounded sharply, eight new funds launched in 2024 raised ¥56 billion, marking a 430% increase from the previous year and signaling renewed investor confidence in ESG-aligned capital markets (EY, 2022).

Table 7: Scale and Growth of Key Green Finance Instruments (2024)

Instrument	2024 Volume (¥ Billion)	YoY Change (%)
Green Loans	35,750	+19.0
Green Bonds	850	–18.0
Transition Bonds	64.86	+53.6
Green Insurance	469,000 (Coverage)	+23.4
Green Funds	56	+433.3
Panda Bonds (Total)	194.8	+26.1
Carbon Trading (ETS)	18.1	+40.6 (Est.)

3.3. DIVERSIFICATION: BUILDING INSTRUMENTS FOR COMPLEX CLIMATE NEEDS

The final and most advanced phase of China's green finance evolution is characterized by instrumental sophistication, aimed at addressing the nuanced financing needs of hard-to-abate sectors such as steel, power generation, and cement. Recognizing the limitations of traditional green finance tools, China has increasingly deployed innovative mechanisms like transition bonds, sustainability-linked instruments (SLBs), and performance-based insurance products that embed accountability and incentives into financial contracts. In 2024, China issued 75 transition-related bonds worth a total of ¥64.86 billion, marking a 53.6% year-on-year increase.

Impressively, over 60% of these instruments included interest rate step-up or step-down features tied to verifiable performance indicators, such as emission reductions, improvements in energy intensity, or procurement of clean energy. SLBs emerged as the most dynamic subsegment, comprising ¥34.97 billion of total issuance, underscoring market appetite for flexible, outcomes-based financial structures. To further align industrial financing with national decarbonization goals, China also pioneered city-level transition taxonomies in hubs like Huzhou, Tianjin, and Shanghai, providing localized yet standardized frameworks for climate-aligned investment. These innovations reflect not just the maturation of China's green finance ecosystem, but its growing capacity to support complex, sector-specific transitions through adaptive financial engineering.

Table 8: Transition-Related Bonds Issued in China (2024)

Bond Type	Number of Bonds	Total Value (¥ Billion)	YoY Growth (%)
Sustainability-linked Bonds	47	34.97	35.1
Low-carbon Transition-linked Bonds	23	17.99	27.8
Low-carbon Transition Bonds	3	10.40	–
Transition Bonds	2	1.50	–
Total	**75**	**64.86**	**53.6**

China's green finance ecosystem has evolved from a policy experiment to a global model, rooted in regulation, scaled through incentives, and diversified through financial engineering. It now supports not just capital allocation but climate accountability.

Looking ahead, China is positioned to:

- Lead international taxonomy harmonization,
- Expand transition finance into new sectors,
- And deploy innovative tools like carbon buyouts, green securitization, and performance-linked sovereign bonds to mobilize capital at scale.

This evolution offers a replicable template for developing countries, including Pakistan, to structure climate-aligned finance while managing sovereign debt risks and building resilient infrastructure.

Section IV

Scoping of Green Financing Instruments for Debt Restructuring and Management

Debt restructuring strategies

Given Pakistan's increasing financial dependence on external creditors, particularly China, debt restructuring and management have become critical for maintaining fiscal stability. The country's debt structure, which includes both high-cost commercial loans and concessional government loans, presents a significant challenge for sustainable economic growth.

This section explores several debts restructuring strategies, including Debt-for-Nature Swaps, Just Energy Transition Partnerships (JETPs), Green Bonds, and bilateral renegotiations with China. These approaches aim to alleviate Pakistan's debt servicing pressures by converting debt into more manageable terms, offering potential financial relief, and aligning with the country's development and climate goals. Additionally, carbon buyouts, interest rate and currency hedging instruments, represent innovative solutions to enhance debt sustainability while addressing environmental concerns.

Prioritizing the instruments

Pakistan stands at a critical crossroads. On one hand, the country is burdened by a mounting external debt of over $130 billion—nearly a quarter of which is owed to China. Much of this is linked to short-term, high-interest commercial loans and coal-based energy projects under the China-Pakistan Economic Corridor (CPEC). In the fiscal year 2023–24 alone, Pakistan paid over $666 million to Chinese lenders in interest and principal repayments. These obligations not only tighten fiscal space but also lock the country into a carbon-intensive development path at odds with its climate goals.

On the other hand, Pakistan faces an urgent imperative to transition its energy system. Climate vulnerability, rising fuel import bills, and global momentum toward decarbonization leave little room for delay. But how can a country restructure its high-cost, climate-incompatible debt while financing a just energy transition—without falling deeper into the debt trap?

This is where financial innovation must become policy priority. Pakistan must pivot from debt-heavy models to non-debt-creating instruments that serve dual purposes: stabilizing its macroeconomic position and enabling sustainable development. Instruments like Managed Transition Vehicles (MTVs) and Energy Transition Mechanisms (ETMs) can facilitate the early retirement of coal assets by blending concessional finance with private capital. Green bonds and asset securitization can unlock funding for clean infrastructure while attracting investors aligned with environmental, social, and governance (ESG) standards.

To make informed choices among these financing options, Pakistan must adopt a structured framework that reflects its economic challenges and climate commitments. This framework should be grounded in five essential criteria for evaluating and prioritizing financial instruments.

In the fiscal year 2023–24 alone, **Pakistan paid over $666 million to Chinese lenders** in interest and principal repayments.

The first is fiscal impact, which assesses an instrument's ability to reduce debt service costs or improve repayment terms, thereby easing fiscal constraints. The second is climate alignment, ensuring that financial flows contribute meaningfully to emissions reduction and support the country's environmental objectives. The third criterion is non-debt potential, which highlights the importance of mobilizing capital without increasing sovereign liabilities, a vital consideration given the scale of existing debt. The fourth is de-risking capability, which considers how effectively a financing tool can mitigate exposure to interest rate fluctuations, currency volatility, or credit risk, making it more attractive to investors. Finally, implementation feasibility examines whether Pakistan's institutional, legal, and regulatory systems are prepared to support the deployment of such instruments. Through this lens, the country can strategically prioritize financial solutions that reinforce macroeconomic stability while advancing a just and climate-resilient energy transition.

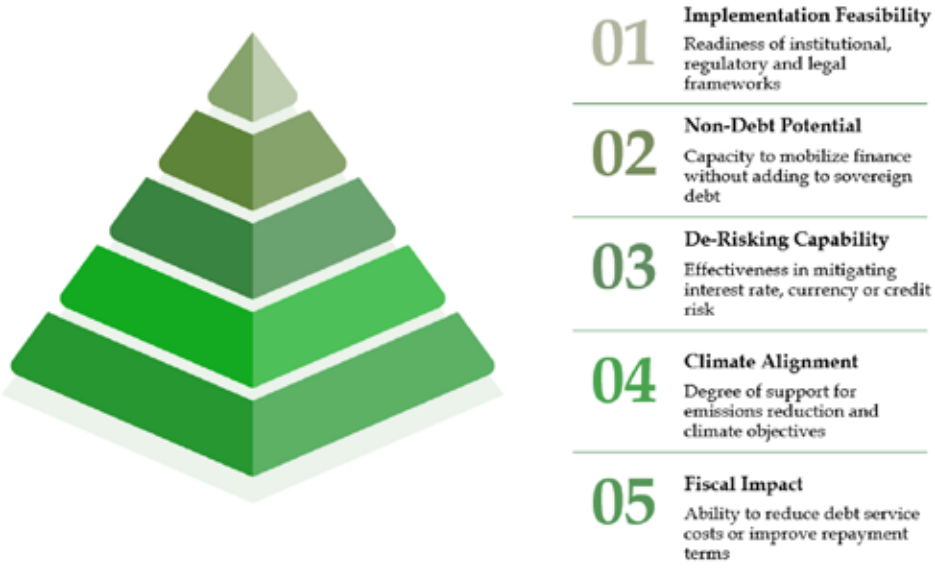


Figure 6: Evaluation Criteria for Prioritizing Financing Instruments

These solutions are not abstract. China itself is now a leader in green finance, offering a strategic opening for Pakistan to renegotiate terms, co-issue green bonds, and secure technology transfers. Prioritizing such instruments is not just a financial necessity, it's a strategic imperative for sovereignty, sustainability, and long-term resilience.

4.1..
INTEREST RATE AND CURRENCY HEDGING INSTRUMENTS IN DEBT RESTRUCTURING

Interest rate and currency hedging instruments are critical tools for managing risks tied to external debt portfolios—especially in economies like Pakistan, where short-term, floating-rate, and foreign currency-denominated loans make debt servicing vulnerable to global market volatility.

- **Interest Rate Swaps**: Allow Pakistan to convert floating interest obligations (e.g., LIBOR/SHIBOR-linked) into fixed-rate payments, providing greater fiscal predictability and protection against rising global interest rates.

- **Currency Swaps and Forwards**: Help lock in exchange rates for future debt payments, shielding the government from adverse currency movements, especially against the USD, where persistent depreciation increases local repayment costs.

Pakistan's debt structure shows clear exposure:

- As of 2024, approximately **USD 3.5 billion** in short-term loans from Chinese banks are tied to **floating interest rates** (LIBOR/SHIBOR) and **denominated in USD**.
- These loans have **1–3 year maturities**, creating ongoing rollover and refinancing pressure alongside rising debt service costs.

4.1.1. China's Use of Hedging Instruments in Other Countries

China has employed currency and interest rate swap agreements to support financial stability and manage debt risks in partner countries:

- **Brazil**: In May 2025, Brazil's central bank announced a currency swap agreement with the People's Bank of China (PBOC) valued at **157 billion reais (approximately USD 27.69 billion)** over five years. This deal aims to enhance liquidity and support financial markets during times of stress, reflecting deepening financial cooperation between the two nations (Reuters, 2025).
- **Argentina**: China has provided emergency liquidity support to Argentina through central bank swap lines, helping the country manage its external debt obligations and stabilize its financial system (Arnold, 2023).

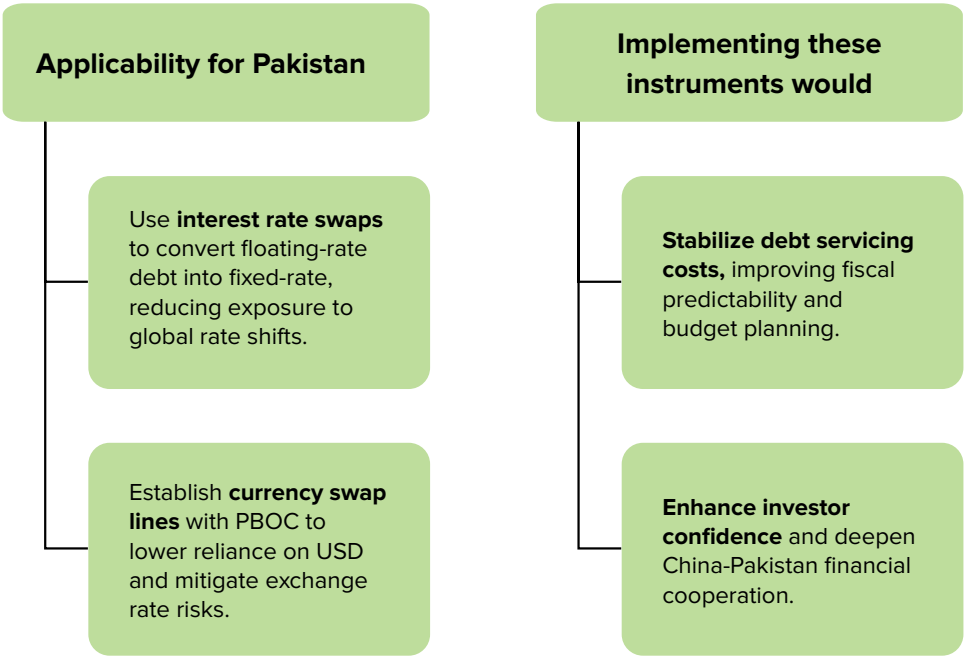


Figure 7: Applicability of Hedging for Pakistan

4.2. MANAGED TRANSITION VEHICLES (MTVS) AND ENERGY TRANSITION MECHANISMS (ETMS)

Managed Transition Vehicles (MTVs) and Energy Transition Mechanisms (ETMs) are innovative blended-finance strategies that offer Pakistan a viable pathway to restructure its coal-related debt while advancing its renewable energy transition. These mechanisms are particularly relevant given Pakistan's significant exposure to high-interest commercial debt—especially under the China-Pakistan Economic Corridor (CPEC), where coal power plants represent both financial and environmental burdens. As of March 2024, Pakistan's total external debt stood at $130.85 billion, with $28.79 billion (22%) owed to China, including $3.5 billion in short-term, high-interest loans tied to Chinese banks. During FY 2023–24 alone, interest payments to China reached $420 million, with an additional $246.7 million in principal repayments. These figures highlight the unsustainable nature of Pakistan's coal-financed debt and the urgent need for restructuring.

By leveraging concessional financing and private-sector investment, MTVs and ETMs can support the early retirement of coal assets and redirect capital toward sustainable energy systems. Specifically, implementing these mechanisms in Pakistan could unlock financing for:

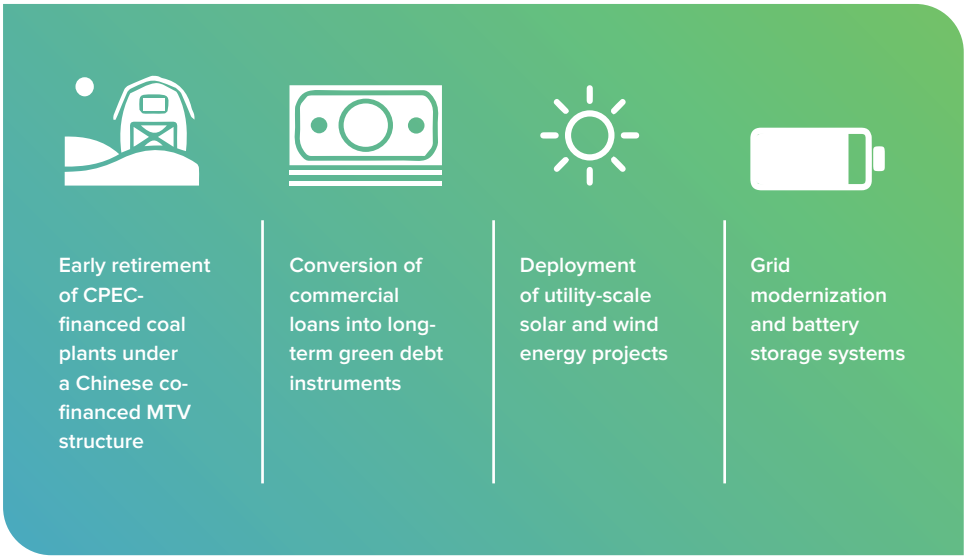


Figure 8: Leveraging concessional financing and private-sector investment

These applications would not only ease fiscal pressure but also align with Pakistan's international climate goals and long-term energy security agenda, while offering China a reputational opportunity to lead South-South climate finance and export its clean technology solutions.

4.2.1. China's Involvement & Strategic Implications for Pakistan

While China has not formally adopted the ETM or MTV nomenclature, its evolving

energy finance policies increasingly mirror these models in both intent and function. Following President Xi Jinping's 2021 pledge to cease financing new overseas coal power plants, China has redirected capital toward renewable energy investments and industrial decarbonization in Global South countries. As of 2024, China has invested over USD 24.5 billion in climate-related projects abroad, positioning itself as a major financier of global clean energy (Yang & Shi, 2025).

Domestically, China has simultaneously ramped up investment in clean energy technologies, becoming the world's largest investor in renewables. Despite coal still constituting 69.4% of power generation in 2022, clean energy (including solar, wind, hydro, and nuclear) now accounts for over 31.5% of the energy mix (Zhang et al., 2024). Through synergistic coordination of technology innovation, environmental governance, fiscal policy, and financial market development, China's energy transition strategy aligns with the structural components of ETM and MTV frameworks (Liu et al., 2025).

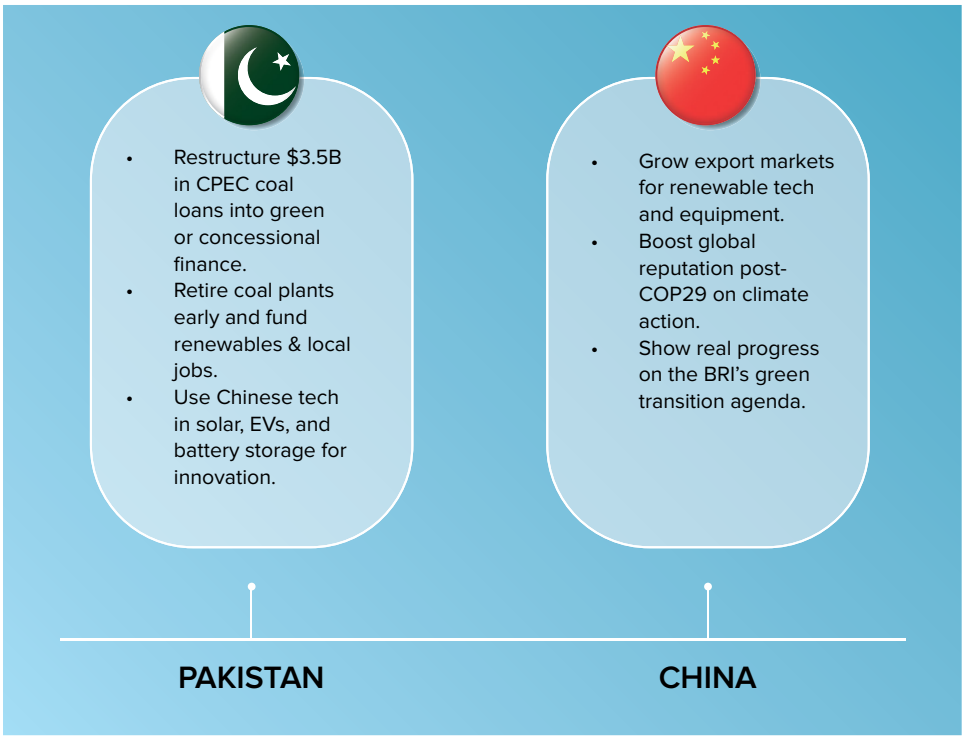
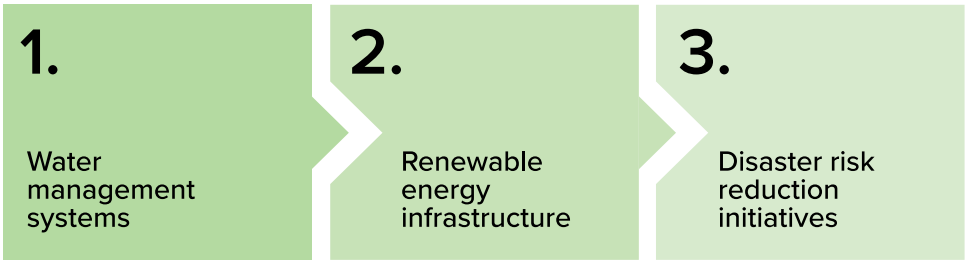


Figure 9: Strategic Benefits of ETM/MTV Adoption

4.3. DEBT-FOR-NATURE AND DEBT-FOR-CLIMATE SWAPS

Debt-for-Nature and Debt-for-Climate Swaps offer a practical solution for Pakistan to manage its growing debt obligations to China while addressing critical climate resilience needs. With China being Pakistan's largest bilateral creditor, holding approximately USD 21.39 billion in government-to-government loans as of 2024, these swaps present an opportunity for Pakistan to restructure its financial obligations in exchange for commitments to invest in climate adaptation and environmental protection.

For Pakistan, this could mean using the savings from debt restructuring to finance projects such as:



These areas are urgently needed given the country's vulnerability to climate events like flooding and water scarcity. Instead of paying off the debt to China, the money would be directed toward long-term sustainable solutions that benefit both the environment and the economy.

4.3.1. Examples of China's Involvement in Debt-for-Nature and Debt-for-Climate Swaps

China has begun exploring debt-for-nature swaps as a means to support environmental conservation while addressing the debt burdens of its partner countries. A significant example is the debt-for-development swap between China and Egypt in October 2023. The two nations signed a memorandum of understanding to restructure USD 100–120 million of Egypt's debt into green development projects, marking a substantial move toward using debt swaps for sustainable development (Taylor & Dempsey, 2024).

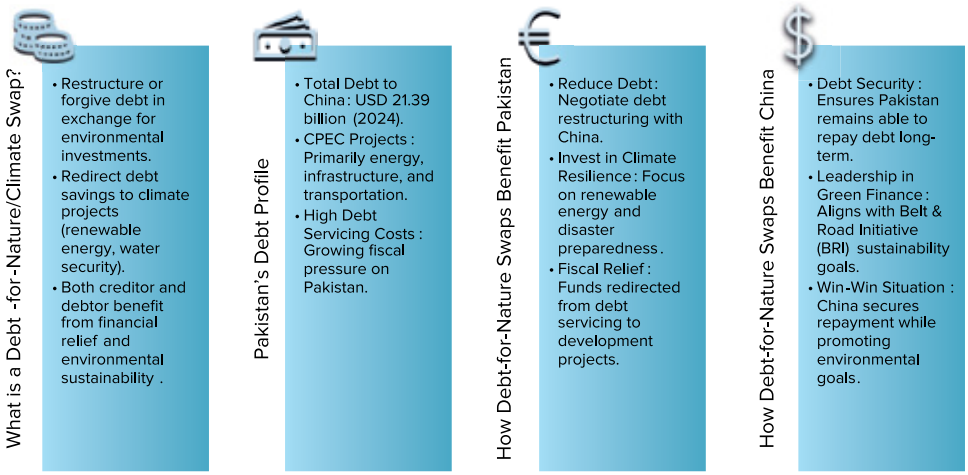


Figure 10: Debt-for-Nature/Climate Swaps: Relevance for Pakistan and China

4.4. DEBT-FOR-CARBON SWAPS

Pakistan's USD 28.79 billion debt to China (as of 2024), a significant portion of which is tied to coal-based power projects under CPEC, makes the country an ideal candidate for debt-for-carbon swaps. Given the country's limited fiscal space and substantial emissions associated with its new coal fleet, a carbon-based restructuring approach could offer debt relief in return for retiring or repurposing coal assets.
By quantifying and certifying avoided emissions from early coal retirement, Pakistan could engage with bilateral creditors or climate finance institutions to offset a

portion of its debt with carbon revenues. For example, shutting down or converting high-emission plants such as Sahiwal or Port Qasim ahead of their planned lifetime could yield measurable emissions reductions, which could then be used as a basis for debt cancellation or restructuring.

Additionally, such swaps could be supported by international carbon buyers through voluntary carbon markets or multilateral climate funds such as the LEAF Coalition, Climate Investment Funds (CIF), or Green Climate Fund (GCF). Leveraging avoided emissions in this way could help restructure Pakistan's costly short-term commercial loans, particularly the USD 3.5 billion owed to Chinese commercial banks with high interest rates and short tenors.

Implementing debt-for-carbon swaps would also support Pakistan's international climate commitments, including its updated Nationally Determined Contributions (NDCs), and send a strong signal of alignment with global decarbonization pathways. With the appropriate institutional setup, such as a national carbon registry and independent emissions verification system, Pakistan could establish itself as a credible player in emerging carbon-financed debt frameworks.

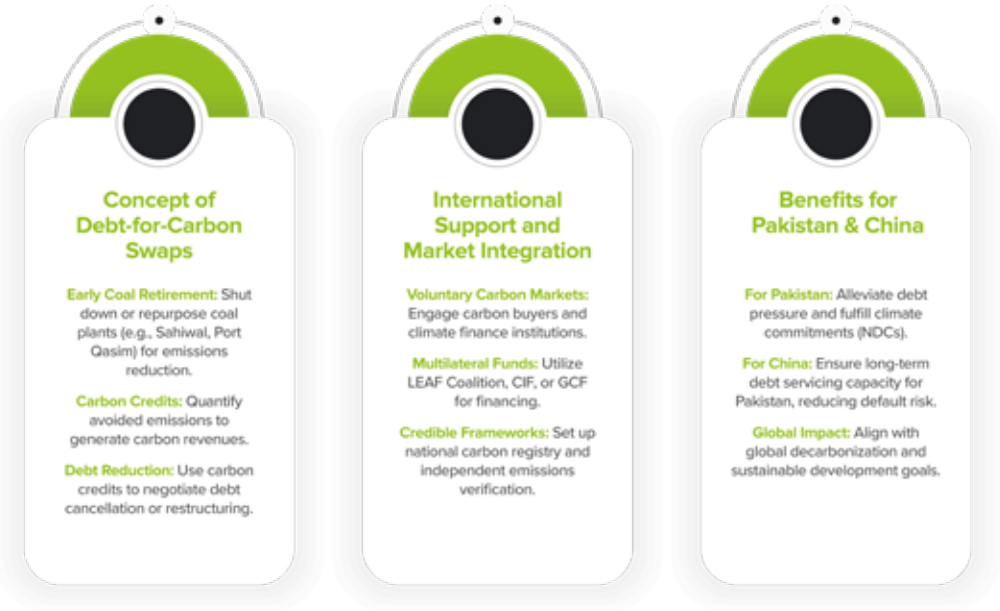


Figure 11: Debt-for-Carbon Swaps as a Strategic Solution for Debt Relief & Emission Reduction in Pakistan

4.5. GREEN BONDS AND ASSET SECURITIZATION

Green bonds and asset securitization have emerged as effective tools for countries seeking to restructure high-cost debt while transitioning to sustainable and climate-resilient infrastructure. For Pakistan—facing mounting debt obligations, especially from short-term, high-interest loans related to coal infrastructure, green finance offers a dual opportunity: to ease fiscal pressures and accelerate the renewable energy transition. With China simultaneously advancing its global leadership in green finance, there is increasing potential for Pakistan to tap into this ecosystem through bilateral cooperation, co-financed bonds, and technology transfers.

- As of March 2024, Pakistan's total external debt stood at USD 130.85 billion.
- USD 28.79 billion (22%) of this is owed to China.
- A particularly burdensome portion is USD 3.5 billion in short-term commercial loans from Chinese banks, tied to LIBOR/SHIBOR-linked rates.
- In FY 2023–24, Pakistan paid USD 420 million in interest and USD 246.7 million in principal to Chinese lenders.
- Much of this debt is linked to coal-fired power plants under the China-Pakistan Economic Corridor (CPEC), worsening both fiscal stress and environmental risks.

4.5.1. China's Expanding Green Finance Footprint

China's green finance sector has experienced significant growth (Yue & Nedopil, 2025), offering both a model and potential financial support for Pakistan's renewable energy ambitions:

- **Outstanding Green Loans:** As of Q3 2024, China's green loan portfolio reached CNY 35.75 trillion (approximately USD 4.9 trillion), marking a 19% increase from 2023. Green loans accounted for 13.9% of all domestic loans in China.
- **Green Bond Issuance (2024):** Despite an 18% contraction in issuance volume, China maintained a leading position in the global green bond market. Green bonds comprised 0.85% of the domestic bond market, down from 1.17% in 2023.
- **Carbon-Neutral Bonds:** Issuance increased by 7%, with a 19% rise in the number of bonds issued.
- **Blue Bonds:** Volume surged by 519%, reflecting growing investor interest in water and ocean-related infrastructure.
- **First Global Green Sovereign Bond:** In April 2025, China issued a CNY 6 billion (approximately USD 825 million) green sovereign bond on the London Stock Exchange. The bond featured 3- and 5-year maturities with sub-2% interest rates, aimed at funding green infrastructure projects.

This robust expansion in green finance positions China as a key facilitator of green transitions in developing countries, including Pakistan.

In Pakistan, China has already invested in significant renewable energy projects:

- **Quaid-e-Azam Solar Park:** Located in Bahawalpur, this solar park is one of the largest in the world, with an expected capacity of 1,000 MW. The project, developed in phases, has been a flagship initiative under the China-Pakistan Economic Corridor (CPEC)
- **Sachal Wind Farm:** Located in Jhimpir, Sindh, this project adds another 50 MW to Pakistan's wind energy capacity(Cleantech Law Partners, 2017).

This highlights China's role in supporting Pakistan's shift towards renewable energy. By leveraging China's green finance mechanisms, Pakistan can further develop its renewable energy infrastructure, reducing reliance on high-interest loans and fossil fuels

Pakistan is also gradually laying the foundation for a domestic green bond ecosystem:

- **Parwaaz Green Action Bond (2025):** The first PKR-denominated green bond was issued to support a wide range of clean energy, green transport, and climate mitigation initiatives across Pakistan (Pakistan Today Profit, 2025).

These precedents demonstrate strong market appetite and can be scaled further through co-issuance models with China or international financial institutions.

Table 9: Strategic Integration for Pakistan of Green Bonds

Instrument	Application in Pakistan-China Context
Green Sovereign Bonds	Refinance up to **USD 3.5 billion** in high-interest Chinese commercial loans; issue in global markets
Co-Branded Bilateral Bonds	Explore joint issuance with China's sovereign or development banks; mobilize blended finance via bond markets
Asset-Backed Securities	Pool renewable energy projects (e.g., Quaid-e-Azam Solar Park, Karot HPP) into tradeable green securities
Blue/Carbon-Neutral Bonds	Target water infrastructure, agriculture resilience, and carbon offset investments in vulnerable provinces

4.6. TRANSITION CREDITS: A FINANCIAL ENABLER FOR COAL-TO-CLEAN ENERGY SWITCH

Transition credits are an emerging financial instrument designed to facilitate the accelerated retirement of coal-fired power plants by monetizing the environmental and social benefits of early coal phase-outs. These credits allow coal plant owners and investors to receive financial compensation for shutting down or repurposing coal assets ahead of their planned operational lifespans, effectively turning avoided carbon emissions and social transition costs into tradable financial assets.

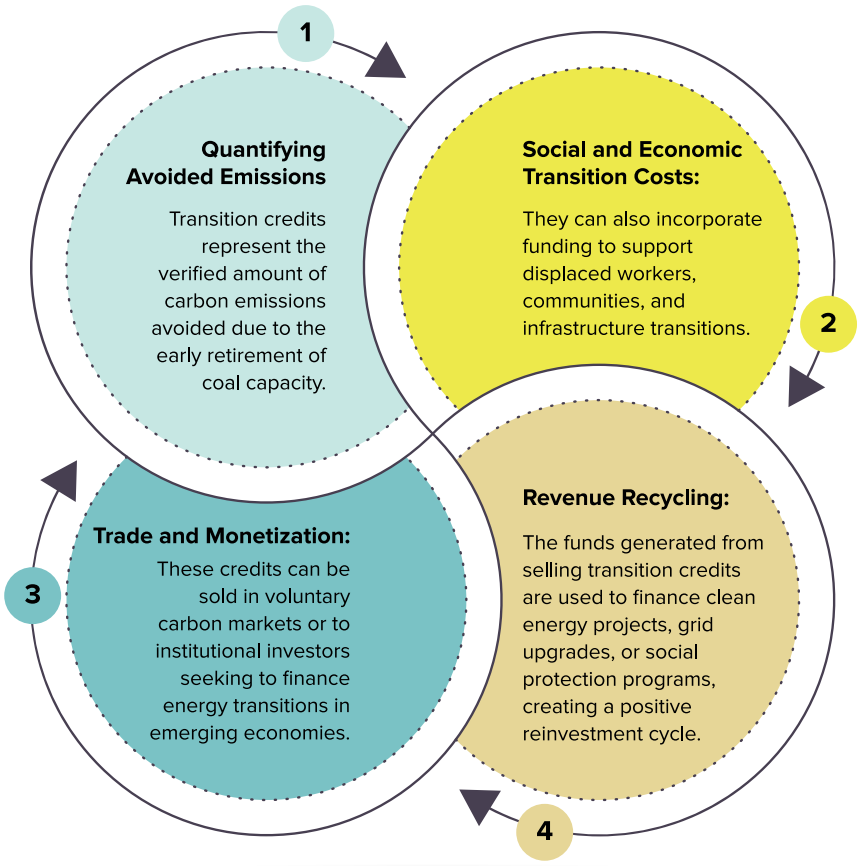


Figure 12: Working Mechanism of Transition Credits

4.6.1. Relevance for Pakistan

Pakistan, heavily dependent on coal-fired power under CPEC and burdened with high-cost debt linked to these assets, stands to benefit significantly from adopting transition credits:

- **Financial Relief**: Transition credits can monetize the environmental and social benefits of retiring coal plants, generating funds that help offset stranded asset costs and reduce fiscal strain.
- **Just Energy Transition**: By channeling transition credit revenues into reskilling programs, community support, and clean energy infrastructure, Pakistan can ensure an equitable and socially responsible shift away from coal.

Attracting Private Capital: Transition credits provide a market-based incentive for private investors to support Pakistan's coal phase-out, helping unlock capital that would otherwise be reluctant to invest in transition projects.

Leveraging Partial Risk Guarantees (PRGs) for Debt Stability

Pakistan's growing debt to China has become a significant concern, with nearly USD 29 billion owed, including generous government loans under the China-Pakistan Economic Corridor and about USD 3.5 billion in short-term commercial loans from Chinese banks. These commercial loans come with floating interest rates, exposing Pakistan to the risks of rising global rates and making its debt payments unpredictable and burdensome. This financial uncertainty adds pressure on Pakistan's already tight fiscal space.

Enter Partial Risk Guarantees, or PRGs—a financial innovation that could change the game for Pakistan. PRGs are essentially safety nets provided by international development banks that reduce risks linked to political instability, currency fluctuations, and regulatory changes. By guaranteeing lenders that they'll get their money back even if certain risks materialize, PRGs make investments in risky environments far more attractive. This means Pakistan can tap into cheaper, long-term financing for much-needed projects, especially in renewable energy and infrastructure, by convincing private investors that their money is safe.

For Pakistan, PRGs offer a way to transform expensive, short-term loans into stable, long-term financing. This not only helps Pakistan plan its budget better but also opens doors to impact investors focused on environmental and social goals. Projects to upgrade the power grid, build renewable energy capacity, and bolster climate resilience become more feasible when backed by these guarantees. PRGs help Pakistan navigate political and regulatory uncertainties, smoothing the path for a greener, more sustainable future.

But the benefits don't stop with Pakistan. China, as a major lender through its Belt and Road Initiative, also stands to gain. PRGs reduce the financial risks China faces in these investments by ensuring steady debt repayments and safeguarding returns. This enhances China's global reputation as a responsible financier committed to green and sustainable development. For China, supporting Pakistan with PRGs means protecting its investments while advancing climate goals, a win-win scenario.

Research has shown that PRGs play a vital role in unlocking private capital for sustainable infrastructure, especially in developing countries. By reducing sovereign risk, PRGs encourage private sector involvement, making projects more bankable and investments more secure. When combined with other financial tools like green bonds and sustainability-linked bonds, PRGs form part of a powerful toolkit that countries like Pakistan can use to manage debt better while driving an energy transition toward cleaner, greener growth (International Finance Corporation, 2023) (Kinloch).

4.7. SUSTAINABILITY-LINKED BONDS (SLBS)

Sustainability-Linked Bonds (SLBs) are performance-based debt instruments that link borrowing costs to the achievement of defined Sustainability Performance Targets (SPTs). Unlike traditional green bonds, SLBs allow unrestricted use of proceeds but impose financial penalties—such as interest rate step-ups, if sustainability targets are not met. This creates a direct fiscal incentive for governments and issuers to meet their climate and development goals.

SLBs are issued under rigorous, verified frameworks that include:

- Clearly defined Key Performance Indicators (KPIs)
- A formal target-setting process
- Third-party verification and ongoing public disclosure

For sovereign issuers, SLBs provide access to global capital markets without the rigid earmarking requirements of project-based green bonds. This flexibility enables countries to use funds strategically while remaining accountable to ESG-aligned outcomes.

SLBs are especially suited to Pakistan's debt and climate profile:

- The country faces USD 3.5 billion in short-term, high-interest commercial debt, primarily from Chinese banks and private creditors.
- Pakistan is highly vulnerable to climate shocks including floods, droughts, and extreme heat.
- While traditional green bonds restrict proceeds to specific uses, SLBs offer results-based flexibility—allowing Pakistan to refinance expensive debt particularly to energy sector while incentivizing climate progress.

4.7.1 China's Experience with SLBs and Potential Collaboration

China, through the Bank of China (BOC), has already issued Sustainability Re-Linked Bonds (SRLBs), a domestic version of SLBs, demonstrating strong institutional capacity to structure, monitor, and manage performance-linked financing (Bank of China Limited, 2021).

Key features of China's SRLB framework:

- **Purpose**: Designed to increase capital flows toward sustainable finance, improve ecological outcomes, tackle climate change, and support governance reform.
- **Structure**: SRLBs are used to refinance eligible **Sustainability-Linked Loans (SLLs)**. The bond's coupon is relinked to the achievement of the SPTs associated with the underlying loans.
- **Governance**: Includes a detailed framework for internal evaluation, management of proceeds, disclosure of excluded categories, third-party verification, and annual reporting.
- **Coupon Adjustments**: A performance-based system adjusts bond interest based on ESG performance, using a defined margin mechanism.

Figure 13: Win-Win Case for a Pakistan-China SLB Program

4.8. PANDA BONDS AND RENEWABLE ENERGY FINANCING FOR PAKISTAN

Panda Bonds are yuan-denominated debt instruments issued by foreign entities in China's onshore bond market, particularly the China Interbank Bond Market (CIBM). These instruments have gained strategic importance as a low-cost, diversified financing source for countries in the Global South—including Pakistan—looking to fund sustainable infrastructure and energy transition projects.

By 2025, Panda bond issuance in China reached RMB 800 billion, with over 1,100 foreign institutions from more than 70 countries participating. The total foreign holdings in China's interbank bond market exceeded RMB 4.4 trillion (USD 610 billion) by the end of September 2024, showcasing the maturity and liquidity of the market.

Why Panda Bonds Suit Pakistan's Energy Transition

- Pakistan's debt sustainability issues—coupled with its growing energy demand, make Panda Bonds a timely and strategic instrument to refinance coal-linked liabilities and fund solar, wind, and grid modernization projects.
- These bonds provide access to lower interest rates compared to global dollar markets, especially attractive amid rising external borrowing costs.

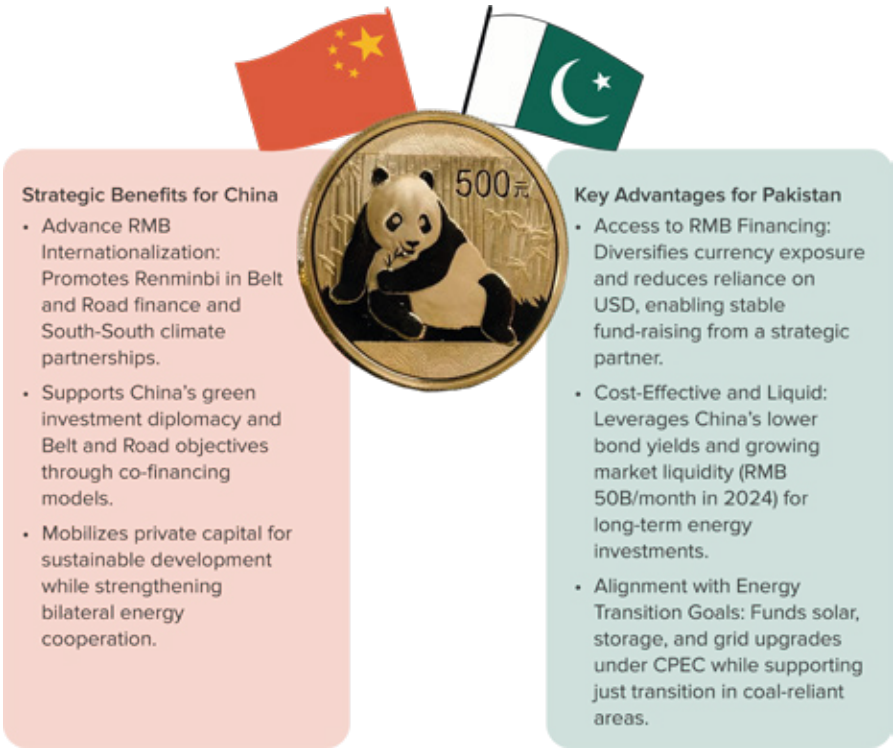


Figure 14: Panda Bonds: A Strategic Win-Win for Pakistan-China Green Finance

4.9. CARBON BUYOUTS: MONETIZING AVOIDED EMISSIONS FOR INFRASTRUCTURE TRANSITION

Carbon buyouts are innovative, results-based financing mechanisms that enable the early retirement or repurposing of high-emission infrastructure by compensating owners and investors based on the monetized value of avoided carbon emissions. Instead of relying solely on regulations or subsidies, this approach transforms emissions reductions into a financial asset, aligning economic incentives with decarbonization outcomes.

How Carbon Buyouts Work

- Emission reductions from retiring polluting assets (e.g., coal plants, industrial zones) are quantified.
- These reductions are assigned a value—either market-based (carbon credits) or social value (climate finance benchmarks).
- The monetized value is used to **buy out** remaining debt, equity, or expected returns of the asset owner, enabling early closure or transition.

Figure 15: Strategic Advantages of Carbon Buyouts

Evidence of Cost-Effectiveness

A 2023 Boston University Global Development Policy Center simulation showed that avoided emissions could be monetized at $10–$15 per ton of CO_2, making carbon buyouts a cost-efficient alternative to public procurement or regulatory shutdowns. The study highlighted their potential for infrastructure with short remaining lifespans but long-term climate impacts (Thrasher & Liu, 2023) (AASHE, 2023).

4.9.1. Suitability for Pakistan's Transition Agenda

Pakistan's infrastructure, especially in power, transport, and industrial sectors, is heavily carbon-intensive and often financed through high-interest, short-term external debt. Carbon buyouts present a pathway to address these challenges by converting climate action into an investable opportunity.

Applications in Pakistan could include:

Coal-fired plants under CPEC, where buyouts offset remaining loan or equity values using emissions credits.

- **High-emission industrial clusters** (e.g., cement or textiles) restructured with results-based finance.
- **Urban transport upgrades**, where retiring diesel-based fleets is financed through monetized avoided emissions.

4.10. GREEN INNOVATION FINANCING PLATFORM (GIFP): A BILATERAL GATEWAY TO CLIMATE-ALIGNED INFRASTRUCTURE INVESTMENT

The Green Innovation Financing Platform (GIFP) is a flagship initiative developed under the Belt and Road Initiative's (BRI) green finance agenda. Led by China's Ministry of Ecology and Environment and supported by institutions such as the China Council for International Cooperation on Environment and Development (CCICED) and the Green Finance Committee, GIFP offers an integrated solution to accelerate low-carbon infrastructure investment across emerging economies—particularly BRI partner countries like Pakistan.

At its core, GIFP functions as a project pipeline acceleration and de-risking mechanism. It aims to fill the persistent gap between climate-aligned investment demand and the availability of bankable, verified, and finance-ready green projects. Unlike traditional finance platforms, GIFP brings together policy banks, commercial lenders, equity providers, ESG service firms, and government partners into a unified framework that supports project origination, validation, financing, and implementation.

4.10.1. Strategic Relevance for Pakistan

Given Pakistan's significant climate vulnerability and financial constraints, GIFP presents an unparalleled opportunity to align debt restructuring with a just energy transition. Pakistan's external debt profile—particularly the $3.5 billion in high-interest loans from Chinese commercial banks tied to fossil fuel infrastructure

Table 10: Strategic Roles of GIFP for China and Pakistan

Dimension	China's Role	Pakistan's Opportunity
Green Finance Ecosystem	Provides access to China's policy banks (CDB, Exim Bank) and blended finance for green infrastructure	Enables Pakistan to mobilize concessional and blended capital for climate-aligned projects
Debt Restructuring Linkage	Facilitates refinancing of legacy coal and carbon-intensive assets under green transition mandates	Supports phaseout of $3.5B high-interest Chinese coal loans through renewable project replacement
Carbon Finance Integration	Integrates carbon pricing, buyouts, and performance-linked instruments into bilateral green financing	Enables Pakistan to monetize avoided emissions and issue carbon-linked bonds or access international carbon finance
Green Bond & SLB Readiness	Encourages issuance of SLBs and green bonds backed by pipeline-ready projects	Enhances Pakistan's credibility for ESG-linked sovereign instruments by applying GIFP standards and disclosure models
Technology Transfer & Localization	Promotes export of Chinese solar, battery, and grid technologies under BRI clean energy diplomacy	Supports Pakistani manufacturing/ local deployment of renewable technologies under joint ventures or concessional terms

Section V

Strategic Realignment of Financial Architecture

Over the past decade, Pakistan's economic engagement with China has deepened substantially, evolving into one of the country's most consequential bilateral financial relationships. This partnership has been institutionalized primarily through the China-Pakistan Economic Corridor (CPEC), a multi-billion-dollar initiative under China's Belt and Road Initiative (BRI). CPEC has aimed to transform Pakistan's economic landscape by financing critical infrastructure—particularly in the energy and transport sectors—with the stated objective of enhancing regional connectivity, industrial capacity, and energy security.

In its initial phases, CPEC facilitated rapid infrastructure buildout. Dozens of projects were launched, including highways, special economic zones, and energy installations—many of which were commissioned ahead of schedule. The energy sector received significant attention, with Chinese financing supporting coal-fired power plants developments. These investments were vital in alleviating Pakistan's chronic electricity shortages, stabilizing supply, and laying the groundwork for industrial expansion.

However, alongside these gains, Pakistan's external financial exposure to China has grown considerably. As of fiscal year 2023–24, Chinese loans account for approximately 22% of Pakistan's total external debt, amounting to $28.79 billion. These liabilities are structured in two distinct forms: concessional government-to-government loans—primarily used for long-term infrastructure development—and commercial loans from Chinese banks such as the China Development Bank, ICBC, and the Bank of China. The latter category of debt is typically short-term, denominated in foreign currency, and linked to floating interest rates such as LIBOR and SHIBOR, thereby carrying higher servicing costs and refinancing risks.

A significant portion of this debt is tied to the energy sector, with over 70% of Chinese investments under CPEC channeled into energy generation projects. While these investments addressed short-term supply constraints, many were centered on fossil fuel technologies, particularly coal. This has led to a development paradox: infrastructure expansion has occurred at the cost of increased carbon emissions and long-term financial commitments that are proving difficult to service amid growing fiscal constraints.

The dual nature of this engagement, providing both necessary development capital and escalating external debt, has emerged as a central concern. It has amplified Pakistan's vulnerability to external financial shocks, constrained public expenditure on social and development programs, and placed the country on a trajectory that is increasingly out of step with global efforts to transition toward low-carbon, sustainable economic models. These dynamics underscore the urgency of reassessing the structure, sustainability, and strategic direction of Pakistan's financing relationship with China, particularly considering broader fiscal pressures and environmental obligations.

5.1. DEBT, DEVELOPMENT, AND EMERGING RISKS

The financial architecture underpinning Pakistan's development partnership with China reflects a complex interplay between long-term concessional support and short-term commercial borrowing. While concessional government-to-government

loans have played a foundational role in enabling large-scale infrastructure development, particularly in transport, energy, and connectivity, they represent only part of the country's external exposure. Over the years, Pakistan has increasingly turned to short-tenure commercial loans from Chinese banks to meet immediate financing needs, such as balance of payments support, budgetary shortfalls, and foreign exchange stabilization.

These commercial loans, typically issued by institutions such as the China Development Bank, ICBC, and the Bank of China, are often tied to floating interest rate benchmarks (e.g., LIBOR, SHIBOR), and come with short amortization periods ranging from one to three years. This lending structure introduces significant fiscal volatility, as debt servicing costs are sensitive to global interest rate movements and currency depreciation. As a result, Pakistan has been forced into a cycle of frequent refinancing, with limited flexibility to allocate fiscal resources toward development, welfare, or economic stimulus. In FY 2023–24, the country's debt servicing obligations to China surpassed $666 million, including $420 million in interest payments alone, an indication of the scale and immediacy of the fiscal burden.

This rising debt stress is compounded by the environmental profile of many CPEC-linked energy investments. A substantial share of energy financing has supported coal-fired power plants, including projects at Sahiwal, Port Qasim, and Hub. While these facilities have contributed to alleviating power shortages, they have also increased Pakistan's dependency on fossil fuels and locked in long-term emissions. This trend poses risks not only to the environment but also to the country's ability to meet its international climate commitments under the Paris Agreement and its own updated Nationally Determined Contributions (NDCs).

Moreover, the dominance of coal-based infrastructure in the CPEC energy portfolio limits Pakistan's eligibility for concessional and performance-based climate finance mechanisms that are rapidly gaining traction in global capital markets. Institutions and investors aligned with environmental, social, and governance (ESG) standards are increasingly reluctant to finance or refinance fossil fuel assets. Consequently, the current financing model imposes dual constraints: on the one hand, Pakistan faces escalating fiscal obligations driven by expensive, short-term debt; on the other, it is restricted from accessing new, more sustainable financial flows due to the carbon-intensive nature of its energy portfolio.

Together, these dynamics highlight the fragility of a development path overly reliant on externally denominated, commercially priced debt and fossil-fuel-driven infrastructure. Without a strategic shift in financing instruments and investment priorities, Pakistan risks deepening both its fiscal vulnerability and environmental exposure—two interlinked challenges that undermine the sustainability of its growth trajectory.

Dependence on Short-Term Commercial Debt	Shift from concessional to short-tenure loans by Chinese banks Loans tied to floating rates with 1 –3 year amortization
Coal-Centric Energy Investments	CPEC energy portfolio heavily reliant on coal (Sahiwal, Port Qasim, Hub) While reducing outages, it deepens fossil fuel dependency
Barriers to Climate-Aligned Finance	Fossil-heavy projects deter ESG-aligned investors and climate finance access Limits eligibility for concessional, performance -based climate funding
Dual Crisis: Fiscal & Environmental Exposure	Expensive, carbon-intensive infrastructure creates unsustainable growth path Without a shift in financing strategy, Pakistan risks escalating both debt burden and climate vulnerability

Figure 16: Fragility of Pakistan's Current Financing Model

5.2. THE CASE FOR FINANCIAL INNOVATION

Given the structural vulnerabilities associated with Pakistan's current debt portfolio—particularly its reliance on high-cost, short-term, and floating-rate commercial loans from Chinese banks, there is a clear need to shift towards a more diversified and sustainable financing strategy. The prevailing model, which emphasizes external borrowing for development finance, has not only heightened fiscal stress but also constrained the country's ability to respond to evolving climate and energy priorities. In this context, financial innovation becomes essential, not as an abstract concept, but as a practical pathway to reducing debt-related risks, improving market access, and enabling green investment.

A central priority is the adoption and scaling of non-debt-creating and blended financial instruments. These mechanisms offer the potential to reallocate existing obligations toward climate-aligned objectives while simultaneously lowering the cost of capital and unlocking new sources of concessional and private finance. Unlike traditional debt instruments, these alternatives are designed to align repayment with developmental or environmental outcomes, thereby improving both fiscal flexibility and financial sustainability.

The key instruments considered include:

1. **Interest Rate and Currency Hedging Instruments**: Many of Pakistan's commercial loans from Chinese banks are tied to floating-rate benchmarks such as LIBOR or SHIBOR and are denominated in foreign currency—exposing the country to interest rate volatility and exchange rate depreciation. Hedging tools such as interest rate swaps, forward contracts, and currency swaps can help stabilize repayment obligations by locking in fixed rates or mitigating foreign exchange risks. These instruments are particularly relevant for short-term loans that require frequent refinancing under uncertain macroeconomic conditions.
2. **Debt-for-Climate, Debt-for-Nature, and Debt-for-Carbon Swaps**: These

mechanisms involve renegotiating bilateral or multilateral debt obligations in exchange for commitments to invest in climate adaptation, biodiversity protection, or emissions reduction. For Pakistan, where a significant share of energy-sector debt is tied to high-emission infrastructure, such swaps can redirect payments toward reforestation, renewable energy, and climate resilience projects—while simultaneously easing debt burdens.

3. **Green Bonds and Sustainability-Linked Bonds (SLBs)**: Green bonds earmark funds for specific environmentally beneficial projects, while SLBs tie debt servicing terms—such as interest rates—to the issuer's performance on pre-agreed sustainability indicators. These instruments can attract ESG-oriented investors and provide a market-based mechanism for financing Pakistan's energy transition, especially if issued in collaboration with Chinese financial institutions.

4. **Transition Credits and Carbon Buyouts**: These tools monetize avoided emissions from the early retirement of carbon-intensive assets, such as coal-fired power plants. By quantifying emission reductions and selling them as transition credits or via voluntary carbon markets, Pakistan could generate funding for debt repayment or renewable energy investment, turning carbon mitigation into a financial asset.

5. **Energy Transition Mechanisms (ETMs)**: These are structured platforms for mobilizing blended finance, combining public, private, and concessional sources, to accelerate the retirement of fossil fuel assets and the scaling of renewable infrastructure. Given Pakistan's exposure to coal-based power through CPEC, these mechanisms offer a realistic model for aligning fiscal restructuring with energy system decarbonization.

6. **Panda Bonds and Partial Risk Guarantees (PRGs)**: Panda Bonds allow sovereign issuers like Pakistan to access China's domestic capital markets in renminbi, offering diversification and potentially lower interest rates. PRGs, typically backed by multilateral institutions, can mitigate investment risk in politically or economically volatile environments. Both instruments can be used to refinance existing high-cost debt and attract long-term, stable capital flows.

Taken together, these instruments form a comprehensive toolkit for addressing Pakistan's dual challenges of fiscal vulnerability and climate misalignment. Their successful adoption will depend on institutional capacity, regulatory readiness, and effective engagement with both Chinese counterparts and multilateral climate finance platforms. Importantly, the strategic deployment of these tools can enable Pakistan to shift away from debt-driven development and toward a model that balances financial sustainability with environmental responsibility.

5.3. STRATEGIC REORIENTATION AND BILATERAL IMPLICATIONS

The evolving landscape of global finance—particularly the growing emphasis on sustainability, climate alignment, and environmental risk management—presents a critical juncture for Pakistan to reconsider the structure of its financial engagement with China. China's increasing role as a global leader in green finance, backed by substantial investments in renewable energy, green bonds, and climate-resilient

infrastructure, opens new channels for bilateral cooperation that move beyond traditional lending relationships.

China's domestic and international financial institutions, including policy banks and commercial lenders, are now actively supporting green bond markets, piloting sustainability-linked financial instruments, and participating in climate-related financing platforms. In this context, Pakistan's existing bilateral debt obligations—especially those tied to environmentally problematic assets such as coal-based power projects—could be strategically renegotiated and repurposed. This may involve transforming parts of the debt portfolio into climate-aligned instruments, such as co-issued green bonds, debt-for-climate swaps, or energy transition facilities co-financed through multilateral and bilateral partnerships.

Such a reorientation also offers the potential for deepened collaboration in areas beyond financing. Technology transfer for renewable energy deployment, local manufacturing of green infrastructure components, and technical assistance in environmental monitoring and emissions accounting are all areas where China's expertise could play a transformative role in Pakistan's development pathway. Joint development of sustainability-linked sovereign instruments, supported by Chinese underwriters or blended capital arrangements, could further enhance Pakistan's access to ESG-focused capital markets.

However, to capitalize on this strategic opportunity, Pakistan must address several foundational requirements. First, institutional capacity must be strengthened to design, manage, and monitor climate-linked financing instruments. This includes the development of a national green finance taxonomy, regulatory frameworks for green bond issuance, and systems for verification and reporting of environmental outcomes. Second, there is a need for coherent policy alignment across fiscal, energy, and environmental domains to ensure that financing instruments are effectively integrated into national planning frameworks.

Furthermore, Pakistan's engagement strategy must become more proactive and coordinated. Engagement with Chinese financial institutions should emphasize mutual benefits—positioning Pakistan as a credible partner in China's green diplomacy while aligning bilateral financing with sustainable development goals. This would enhance Pakistan's credibility in international financial markets, increase access to concessional capital, and help mitigate the long-term risks of debt dependency.

In summary, the transition toward a green finance framework is not only a technical adjustment but a strategic repositioning of the Pakistan-China financial relationship. It represents an opportunity to align fiscal sustainability with environmental imperatives, and to deepen cooperation with China in ways that are both financially prudent and climate resilient.

5.4. POLICY IMPLICATIONS FOR PAKISTAN

The findings of this study carry important implications for Pakistan's fiscal, debt, and energy policy frameworks, particularly in the context of its financial engagement with China. As the external debt burden grows—driven in large part by short-term, commercially priced loans—Pakistan's ability to maintain macroeconomic stability

and fund essential development objectives has been significantly constrained. The following policy areas are identified as critical for ensuring a transition toward more sustainable and resilient financing practices:

a. **Shift Toward Non-Debt-Creating and Blended Finance Instruments:** Policymakers should prioritize the adoption of alternative financing tools, such as debt-for-climate swaps, green bonds, and sustainability-linked bonds (SLBs), which can reduce fiscal pressure while supporting climate-aligned investments. These instruments offer potential to redirect existing debt obligations toward productive, low-carbon uses and attract ESG-aligned international capital.

b. **Institutional Strengthening for Green Finance Governance:** Establishing a robust national green finance framework—including a taxonomy, monitoring and verification systems, and inter-agency coordination—is essential to access global sustainable finance markets. Institutional readiness will also be critical to structuring and managing complex blended instruments such as Just Energy Transition Partnerships (JETPs) and Energy Transition Mechanisms (ETMs).

c. **Strategic Bilateral Engagement with China:** Pakistan should engage China in structured dialogue aimed at reorienting a portion of existing debt within a sustainability framework. This could include proposals for co-issuing green bonds, initiating debt-for-nature swaps, or exploring concessional refinancing tied to the early retirement of carbon-intensive assets. China's expanding green finance ecosystem offers a unique platform for rethinking bilateral financial cooperation.

d. **Integration of Hedging Tools into Public Debt Management:** Given Pakistan's exposure to interest rate and exchange rate volatility—particularly on floating-rate commercial loans—debt management strategies should incorporate interest rate swaps, currency forwards, and other hedging instruments to stabilize fiscal obligations over time.

e. **Energy Sector Financing Reform:** With a substantial share of external debt linked to fossil fuel-based energy projects, there is an urgent need to redesign energy investment plans in alignment with climate targets. Transition credits and carbon buyouts could be integrated into national energy strategies to support early coal phase-out and the scaling of renewable energy capacity.

5.5. CONCLUSION

The analysis conducted in this study highlights the pressing need for a strategic reorientation in Pakistan's external financing framework. The prevailing model—characterized by a reliance on short-term commercial borrowing and investment in carbon-intensive infrastructure—has contributed to mounting fiscal vulnerabilities and environmental misalignment. These patterns are increasingly at odds with the country's long-term economic, financial, and climate objectives.

Pakistan's debt portfolio, particularly its exposure to Chinese loans within the energy sector, reflects structural challenges that extend beyond issues of liquidity. The high servicing costs, currency risk, and short maturity profiles associated with commercial debt have constrained fiscal flexibility, while the predominance of coal-

based energy projects has limited access to emerging climate finance mechanisms and global sustainability-aligned capital. These dual pressures underscore the need for a more sustainable and forward-looking approach to external financing.

In response, this study emphasizes the importance of diversifying Pakistan's financing instruments and prioritizing mechanisms that reduce debt burdens while facilitating the transition to a more resilient and low-carbon economy. Instruments such as debt-for-climate swaps, green and sustainability-linked bonds, transition credits, carbon buyouts, and Just Energy Transition Partnerships offer viable pathways to achieve this dual objective. Their effective adoption will require enhancements in institutional capacity, regulatory readiness, and alignment between fiscal, energy, and environmental policy frameworks.

Furthermore, the evolving nature of China's role in global green finance presents a strategic opportunity for Pakistan to recalibrate its bilateral financial engagement. There is potential to move beyond traditional debt arrangements toward more cooperative and sustainability-oriented financing models that incorporate co-investment, technology transfer, and performance-linked instruments. Such a shift would not only support Pakistan's fiscal and climate goals but also enhance the overall quality and resilience of its economic relationship with China.

In conclusion, the findings of this study point to a necessary transition from a debt-driven development paradigm to one centered on financial innovation, sustainability, and long-term resilience. By prioritizing instruments that align with both fiscal responsibility and environmental imperatives, Pakistan can strengthen its economic foundations and better position itself to meet the challenges of a changing global financial and climate landscape.

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