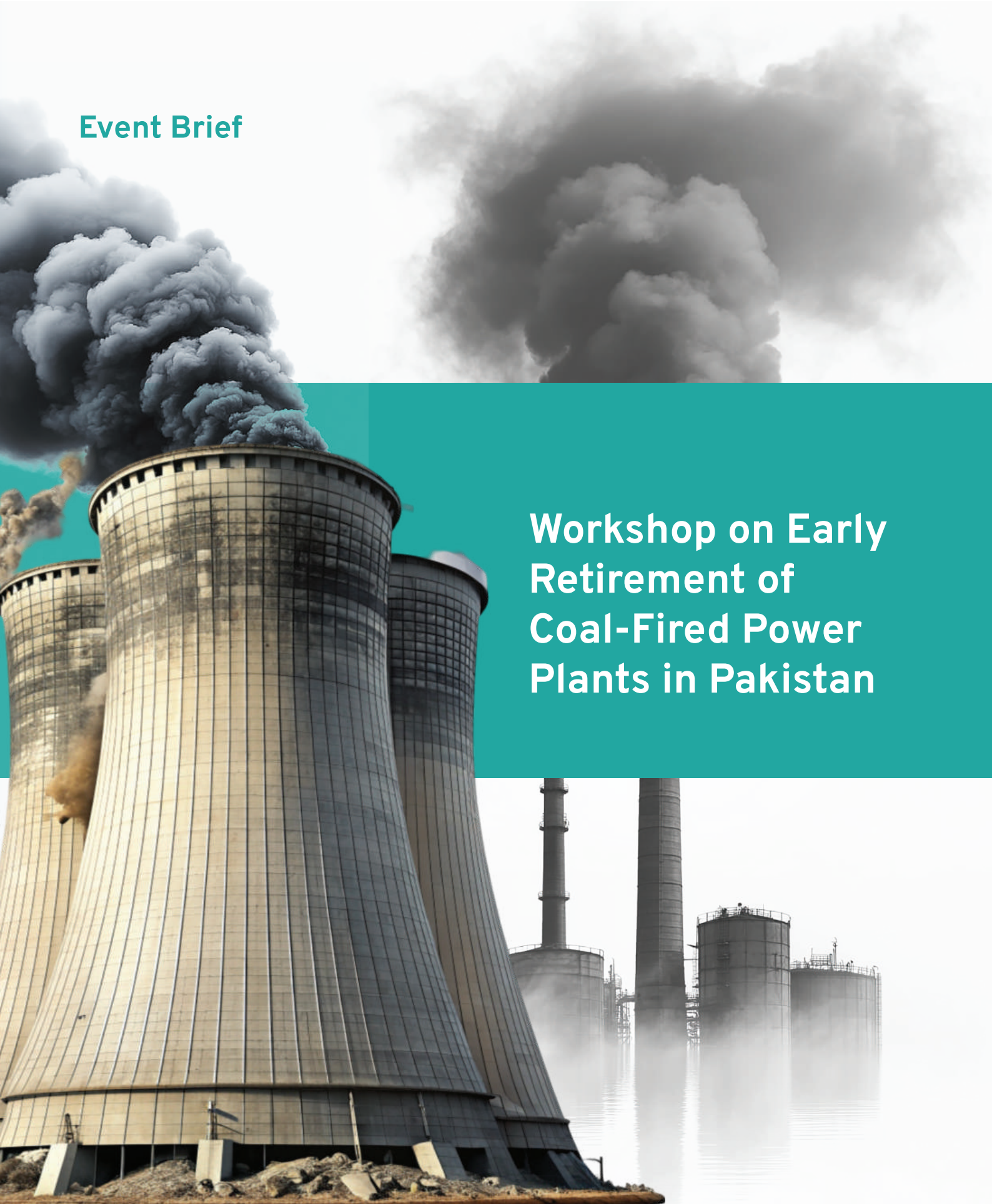


Event Brief

Workshop on Early Retirement of Coal-Fired Power Plants in Pakistan





To resolve the issue of energy deficits, Pakistan turned to coal-fired power plant (CFPP) investments financed by China under the China-Pakistan Economic Corridor (CPEC), a move that bridged the demand-supply gap beginning in 2017. From 2000 to 2016, coal's contribution to electricity generation remained negligible. However, from 2017, coal-fired power capacity increased significantly from negligible levels to approximately 8220 MW in 2024, driven by large-scale plant additions under the CPEC, marking a significant transformation in Pakistan's energy mix. However, with evolving power dynamics, decreasing utilization rate of these plants and worsened climate-related disasters, these power plants are now creating serious financial and environmental challenges. Pakistan faces a dual challenge of managing the economic implications of long-term power purchase agreements (PPAs) and sovereign debt obligations, while aligning with global and domestic climate goals. Many of these plants were constructed in the 2015–2020 window and are currently operating under cost-plus PPAs with high fixed returns, guaranteed capacity payments, and minimal flexibility for early exit or repurposing.

Given Pakistan's vulnerability to climate impacts and rising fiscal constraints in the power sector, early coal retirement has become both an economic and environmental imperative. However, the path forward requires a sequenced, collaborative, and financially viable approach involving domestic stakeholders, international financial institutions, and Chinese counterparts. For China, early coal retirement overseas aligns with Chinese Leader Xi's 2021 pledge to halt new coal financing abroad and the country's commitment to deepen South-South green development.

In this context, the Boston University Global Development Policy Center (GDP Center) and the Sustainable Development Policy Institute (SDPI) convened a multi-stakeholder workshop to explore early retirement pathways for CFPPs in Pakistan. The session brought together government representatives, Chinese and Pakistani financial institutions, energy sector experts, multilateral partners, and civil society to assess the policy, financial, and technical barriers, and to co-develop actionable solutions. The discussion focused on understanding the Pakistani context and China's perspective on early coal retirement by identifying the challenges and opportunities. Tools like coal to clean credit initiative, debt-for-climate swaps and blended finance were also discussed. The workshop was an effort to promote collaboration across governments, financiers, and researchers.

This workshop is part of a broader collaboration between the GDP Center and SDPI on coal transition strategies in Pakistan. Building on these discussions, both institutions will develop a policy-oriented report featuring economic and financial modelling to assess stranded asset risks and explore practical coal phase-out and repurposing pathways.

The following recommendations are grounded in insights and deliberations from the workshop. Discussions reflected the complexity of transitioning away from coal-fired power in a context where energy security, fiscal constraints and climate commitments intersect. Participants emphasized that while early retirement of CFPPs in Pakistan is economically viable, technically possible and climatically urgent, it will require carefully tailored financial instruments, and diplomatic coordination. These recommendations, reflecting a nuanced reality, advance practical and feasible pathways to align Pakistan's energy transition with its climate, development, and fiscal priorities. They also explore the role Chinese stakeholders could potentially play in materializing the process.



8,220 MW

Coal capacity surged from negligible to 8,220 MW by 2024 under CPEC, bridging Pakistan's energy gap.

Structural Barriers to Early Retirement of Coal-Fired Power Plants in Pakistan



Despite the growing consensus around the need for energy system transformation, several systemic and financial challenges continue to inhibit actionable progress in Pakistan.



Figure 1- Key Challenges for Early Retirement in the Pakistani Context

➤ Contractual Inflexibility of Sovereign-Backed PPAs

Long-tenor, cost-plus PPAs offer high and fixed returns to independent power producers (IPPs), underwritten by sovereign guarantees. These contracts are not easily restructured without triggering breach clauses, compensation claims, or arbitration, thereby limiting host-country agency in pursuing early exit strategies.

➤ Increasing Capacity Charges and Fiscal Pressure

Due to a combination of currency depreciation, demand overestimation, and low plant

utilization, capacity charges have risen significantly—reaching 10–13 Pakistani rupees (PKR) per unit in some cases. These charges are payable regardless of dispatch, contributing to Pakistan’s circular debt, which exceeded PKR 2.6 trillion in 2024.

➤ External Debt Exposure to Chinese Policy & Commercial Banks

Chinese lenders have played a central role in financing Pakistan’s coal fleet, and loan tenors remain long, with high debt coverage ratios. Without renegotiation or concessional refinancing mechanisms, these debts act as a major constraint on early asset retirement.

➤ Institutional and Regulatory Gaps

The absence of carbon pricing, weak environmental enforcement, and limited institutional readiness undermine Pakistan’s ability to implement retirement and repurposing strategies at scale. Further, the lack of a clear just transition policy risks delaying progress due to anticipated socioeconomic resistance.

➤ Stranded Investments

The growing threat of stranded assets from CFPPs is reshaping the contours of energy and financial planning. With reducing costs of renewable energy, declining capacity utilization, and international climate finance shifting away from coal, these assets are becoming economically and environmentally unsustainable. Global compliance frameworks like the EU Carbon Border Adjustment Mechanism (CBAM) add further pressure by penalizing carbon-intensive exports. The risk of stranding extends beyond plant operators to include banks, investors, and public institutions exposed to coal-linked liabilities.



PKR 2.6 trillion

Capacity charges reached PKR 10–13 per unit, pushing circular debt beyond PKR 2.6 trillion in 2024.



➤ Develop a National Roadmap for Energy Transition

Pakistan should formulate a coordinated, multi-stakeholder strategy that defines the role of coal phase-out, identifies candidate plants for early retirement, and sets out targets for renewable energy and grid modernization. This roadmap should include fiscal, regulatory, and social protection components to manage the transition effectively.

The government could take the lead in crafting clear, actionable policies that drive the transition. Once the national roadmap is in place, programs such as ADB's Energy Transition Mechanism (ETM) and Just Energy Transition Partnerships (JETPs) can offer technical assistance, regulatory guidance, and align these efforts with global climate goals. What is more, China's Green Investment Finance Partnership has the potential to play a key role in Pakistan's Energy Transition agenda.

➤ Pilot an Early Retirement Case Study

Work by the SDPI and the GDP Center will develop a framework and analysis for analysing the financial trade-offs and opportunities for early coal retirement in Pakistan. Guided by such analysis and others it may be prudent to select a representative CFPP as a pilot site for early retirement or repurposing. Building on our

existing collaboration, a detailed feasibility study of the chosen CFPP should be undertaken, including stakeholder consultation, emissions baseline assessment, financial modelling including debt restructuring and transition finance structuring.

➤ Design and Implement a Just Transition Framework

To ensure a just transition from early coal retirement, the government should create a comprehensive policy framework that includes both economic reinvestment and social safeguards for the communities that are affected by early coal retirement. Proceeds from these CFPPs should be directed towards clean energy projects such as utility-scale solar, wind, or battery storage at the same sites. These projects will facilitate the workforce retention and local economic continuity, key tenets of a just transition.

Also, to ensure that retirement pathways are socially equitable by including reskilling programs, employment guarantees, and community reinvestment initiatives in affected regions. These efforts can serve both economic and environmental functions in the transition.

➤ Modernize Grid Infrastructure

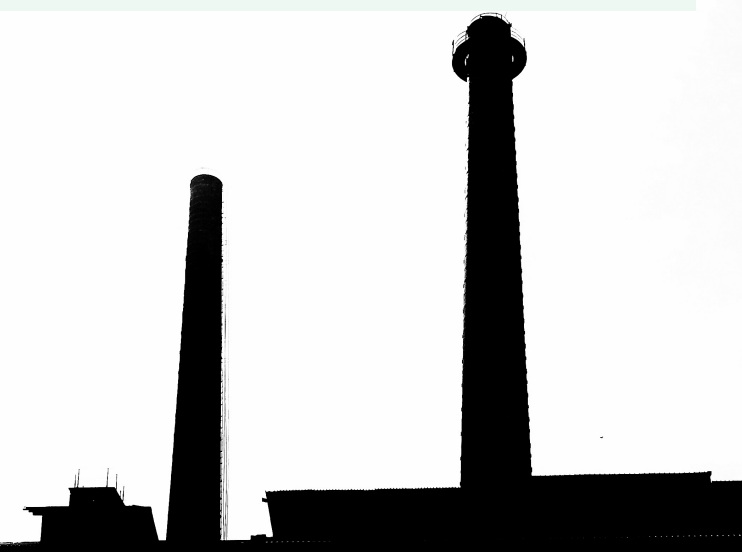
The government should prioritize investments in grid capacity, transmission resilience, and digital management systems to support higher levels of intermittent renewables, and to accommodate rising intermittent renewables and reduce technical losses, which remain as high as 17–19% in some regions.

➤ Frame Early Retirement as a Climate Prosperity Opportunity

Recast Pakistan's coal phase-out not as a cost burden but as a strategic opportunity to reduce fiscal pressure, attract clean investment, improve air quality, and demonstrate leadership among climate-vulnerable countries. Aligning this effort with Pakistan's climate diplomacy and economic planning will be essential.

➤ Align with China's Green BRI and Climate Commitments

Engage Chinese lenders and sponsors through formal dialogue channels to align early retirement efforts with China's 2021 commitment to end overseas coal financing and expand support for low-carbon investments.



17–19% losses

demand urgent grid, transmission, and digital upgrades for renewable integration.



➤ PPA Restructuring via Equity Return Adjustment

A reduction in allowable equity returns from 17–25% to 12–14% could yield fiscal savings on capacity payments and shorten the economic lifetime of certain coal assets. In the case of Sahiwal or Port Qasim, preliminary modelling by SDPI and the GDP Center suggests that such revisions could bring forward retirement timelines by up to a decade, while avoiding the immediate need for full asset buyouts.

➤ Subsidized Interest Rate Mechanisms for Early Retirement

Deploying concessional capital to underwrite interest rate subsidies, rather than direct buyouts, may represent a more cost-effective path to early retirement. For instance, the capitalized value of an interest rate subsidy enabling 15-year early retirement could be up to 20% lower than full equity redemption costs.

➤ Debt-for-Climate Swaps and Hybrid Blended Instruments

Given Pakistan's external debt exposure to Chinese commercial and development finance institutions (e.g., China Development Bank, Exim Bank), debt-for-climate swaps structured around measurable coal retirement milestones offer a viable path to reducing fiscal stress while enhancing energy sector decarbonization. These could be integrated with multilateral transition finance facilities such as the ADB's Energy Transition Mechanism (ETM).

➤ Integrated Grid Planning and RE Dispatch Optimization

Early coal phase-out will require compensatory investments in grid modernization. Upgradation of transmission networks, enhancing system flexibility, and integrating distributed renewable energy (~5,500 MW rooftop solar pipeline) are prerequisites for reliably replacing baseload coal generation without inducing load shedding or curtailment.

➤ Engage Chinese Stakeholders in Structured Dialogue

Initiate high-level bilateral engagement between Chinese financiers, project sponsors, and relevant ministries to explore flexible approaches to debt restructuring, equity return adjustment, or concessional refinancing, in line with China's green finance commitments under the Belt and Road Initiative (BRI).

➤ Capitalizing on China's Financial Prowess

Advocate for loan rollovers, concessional refinancing, or conversion of sovereign loans into climate-linked finance, backed by jointly developed MRV (Monitoring, Reporting, and Verification) frameworks.

➤ De-risk through Carbon Market Integration

Explore integration with China's domestic emissions trading system or voluntary carbon markets to create monetizable emission reduction credits, further incentivizing early retirement.

➤ International and Blended Finance Mechanisms

To facilitate the early retirement of CFPPs in Pakistan, a combination of financing mechanisms can be utilized. Blended finance can reduce investment risks by combining concessional and private-sector funding, while concessional capital from multilateral institutions can ease financial pressures. Carbon credit instruments can provide additional revenue by monetizing emissions reductions from coal plant decommissioning. Green bonds and climate bonds can raise funds for renewable energy projects, while climate finance facilities such as the Green Climate Fund can support low-carbon transitions. Moreover, private equity and venture capital can fund innovative clean energy solutions, and debt-for-climate swaps can reduce Pakistan's fiscal burden by restructuring debt in exchange for climate action commitments. Pakistan needs a well-curated financial framework for the early retirement of coal plants.

Text:

Zainab Babar, Researcher, Sustainable Development Policy Institute (SDPI)

Dr Ying Qian, Non-Resident Senior Fellow, Boston University GDP Center

Dr Khalid Waleed, Research Fellow, Sustainable Development Policy Institute (SDPI)

Lin Zhu, Program Manager, Boston University GDP Center

Kevin P. Gallagher, Director, Boston University GDP Center ; Professor, Global Development Policy, Boston University

Mengdi Yue, Independent Research Consultant, Boston University GDP Center

Sadia Satti - Project Associate, Sustainable Development Policy Institute (SDPI)

Design:

Umair Hassan, Sustainable Development Policy Institute (SDPI)