ENERGY AND CLIMATE
PANORAMA

Industrial De-carbonization Strategies Under Influence of Climate Financing in the Core Industrial Sectors of Pakistan for Achieving Net Zero through Coal Phase-out

U.S.-Pakistan Center for Advanced Studies in Energy

ABOUT US

Who we are

We are a dedicated team of researchers and experts who recognize the urgent need for action in addressing climate resilience and energy transition in Pakistan. Our mission is to develop and implement effective policies for cleaner, renewable energy sources like solar and wind, aligning with Pakistan's 2030 goal of 30% renewable energy in its electricity mix. As a multidisciplinary team, we leverage expertise in three key disciplines of study—Energy Systems Engineering, Thermal Energy Engineering, and Electrical Power Engineering—to drive our mission forward. We are united by a shared vision of creating a sustainable and resilient future for Pakistan, where cleaner energy sources play a pivotal role in reducing the nation's vulnerability to climate-related challenges.

What we do

We conduct in-depth, evidence-based research to analyze and improve energy policies in Pakistan. Our focus is on advancing renewable energy solutions and engaging stakeholders to ensure effective policy implementation. Our methodology involves a critical examination of current energy policies to pinpoint areas of improvement and formulate strategies for the widespread adoption of renewable energy sources across various levels.

In line with our commitment to fostering sustainable practices, we have established a fellowship program as part of our broader initiatives that aims to facilitate evidence-based research for promoting energy transition in Pakistan. Through research studies, surveys, and forecasting, we plan to assess various aspects of energy transition, including the adoption of renewable energy technologies and their impact on climate change. Our approach involves active engagement with stakeholders to address their concerns and facilitate the effective implementation of policies, fostering the growth of renewable energy manufacturing and marketing facilities.

CONTACT US

Industry Liaison & Outreach Office
Bilal Mehmood Bhutta
Phone: +92-51-90855274
Fax: +92-51-90851302
Email: ilo@uspcase.nust.edu.pk
USPCAS-E Building, National University of Sciences & Technology, H-12, Islamabad.

Primary Contributors

DR. RABIA LIAQUAT
PRINCIPAL INVERSTIGATOR
Associate Professor

DR. QAZI SHAHZAD ALI
CO - PRINCIPAL INVERSTIGATOR
Assistant Professor

ASHFA ASHRAF
RESEARCH ASSISTANT
MS in Thermal Energy Engineering

MR. MANZOOR AHMED
SR. RESEARCHER (ENERGY & CLIMATE)
Policy Research Institute for Equitable Development (PRIED)

MS. QURRATUL AIN
RESEARCHER
Policy Research Institute for Equitable Development (PRIED)

Layout Design

ABDUL REHMAN
RESEARCH ASSISTANT
MS in Thermal Energy Engineering

FATIMAH ARSHAD
RESEARCH ASSISTANT
MS in Thermal Energy Engineering

SEHAR BOKHARI
RESEARCH ASSISTANT
MS in Energy System Engineering

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Executive Summary

The urgent challenge of climate change requires immediate and holistic response across industries, specifically in textiles and cement industries of Pakistan. This research assesses how climate financing shapes industrial decarbonisation efforts with the goal of achieving net zero through the phase out of Coal. According to the study, the textile sector in Pakistan is the largest emitter of Green House Gas (GHG), especially where energy is derived from coal-based cement industry. The introduction of global mechanisms such as carbon pricing and the Carbon Border Adjustment Mechanism (CBAM) presents risks to Pakistan's export-driven economy, it is high time to move Pakistan towards sustainable economy. The key aims of this research are to explore theoretical options for decarbonising textile and cement industries in Pakistan, Analyse the Techno-Economic Potential for a Coal Phase-out through climate finance, analyse the applicability and implications of net-zero scenarios in niche emitting sectors. A techno-economic model was designed by employing RETScreen software in order to design decarbonization strategies. The Chinese and Indian case studies gave an understanding of good practice for industrial decarbonisation. Measures to achieve decarbonisation include the elements like the use of renewable energy, water recycling, and energy reduction mechanisms like the waste heat recovery and Combined Heat and Power (CHP) systems. Clean resources like sun and wind energy are very important. They not only help to avoid the dependency on fossil fuels but, most importantly, greatly decrease emissions of CO_2. Waste heat recovery systems are also another critical part which involves using heat from process that are in industries that would have gone to waste.

Energy-efficient solutions in the textile industry not only enhance sustainability but also significantly reduce operational costs. Advanced wastewater treatment technologies play a crucial role by minimizing environmental impacts, ensuring that water used in dyeing and finishing processes is treated and recycled, thereby reducing overall water consumption. Climate financing is pivotal in providing financial support for the adoption of renewable energy and energy-efficient technologies within the textile sector. Financial institutions are key drivers of sustainability, offering green bonds and sustainability-linked loans that incentivize textile companies to implement eco-friendly practices and reduce their environmental footprint. On the other hand, 'End Users' include actors such as government and other authoritative institutions that set policies and pass laws that elicit the promotion or enforcement of sustainable practices. Some of the policies include subsidies for renewable energy projects, tax credits on energy efficiency technologies and polices and legislation on environmental compliance. This research highlights the decarbonization strategies and climate finance instruments to incentivize the decarbonization in textile and cement industry eventually serving as a roadmap for policy makers and stake holders. Balancing the emissions in textile and cement industries of Pakistan is possible by integrating efforts rising from adoption of new technologies, improvement of current existing policies and last but not the least international funding.