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GREENING THE GIANTS:

A DISCOURSE ON THE GENESIS OF SUSTAINABILITY FOR LARGE INFRASTRUCTURE PROJECTS IN PAKISTAN, PARTICULARLY ALONG THE CPEC

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**UEP WIND POWER PROJECT
JHIMPIR WIND CORRIDOR**

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Abbreviations and Acronyms

CPEC	China-Pakistan Economic Corridor
BRI	Belt and Road Initiative
ADB	Asian Development Bank
MoPD&SI	Ministry of Planning, Development, and Special Initiatives
JCC	Joint Cooperation Committee
SBFN	Sustainable Banking and Finance Network
CDB	China Development Bank
ICBC	Industrial and Commercial Bank of China
AIIB	Asia Infrastructure Investment Bank
ESG	Environmental Social Governance
GHGs	Greenhouse Gases
EPA	Environmental Protection Agency
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
SBP	State Bank of Pakistan
NEQS	National Environmental Quality Standards
SMART	Self-Monitoring and Reporting Program
DFIs	Development Finance Institutions
UNFCCC	United Nations Framework for Climate Change Convention
PSDP	Public Sector Development Programme
GDP	Gross Development Product
PBC	People's Bank of China
ABC	Agricultural Bank of China
BoC	Bank of Communications
SECP	Securities and Exchange Commission of Pakistan
GBG	Green Banking Guidelines
NDC	Nationally Determined Contributions
GEF	Global Environment Facility
GCF	Green Climate Fund
IFC	International Finance Corporation
VRE	Variable Renewable Energy
IGCEP	Indicative Generation Capacity Expansion Plan
MSW	Municipal Solid Waste
CSA	Climate Smart Agriculture
ESCO	Energy Supply Companies
SWM	Solid Waste Management
ESRM	Environmental and Social Risk Management
CEET	Carbon Emissions Estimator Tool
EDGE	Excellence in Design for Greater Efficiency
CCDR	Country Climate Development Report
UNDP	United Nations Development Programme
SEED	Social and Economic Development Programme
FCDO	Foreign Commonwealth and Development Office
NEPRA	National Electric Power Regulatory Authority
HPP	Hydro Power Plant

Executive Summary

China-Pakistan Economic Corridor (CPEC), an economic and infrastructure nexus between the two countries as part of Belt and Road Initiative (BRI), mainly focuses regional trade, infrastructure connectivity and strategic alliances. The projects under this programme are likely to fulfil Pakistan's economic and security aspirations to have a well-connected, integrated region of shared destiny, harmony, and development.

Pakistan's climate vulnerability

In 2022, just as Pakistan started breathing easy on the back of a diminishing COVID-19 rate and a normalizing domestic and global economic regime, like a deer caught in the headlights, it was struck by the worst floods in its history. The preceding monsoon rains were the heaviest and most concentrated it had ever experienced, with one third of the country under water, hundreds of fatalities and two million homes destroyed. Infrastructure damages floods have been estimated at around US\$15 bn while economic losses are at \$ 15.2 billion - a bane to anticipated growth performance. There will be prolonged implications for poverty, health, and other social metrics. Rehabilitation requirements are adjudged at \$16.3 billion, excluding new investments required to build systemic mitigating structures within the country's environment eco-system.

In the midst of these cataclysmic events, there is a consensus within Pakistan and elsewhere that climate change is at the heart of this conundrum and the country needs to devise and implementing-term bespoke solutions to its unique problems. There is a realization among the international community that Pakistan has been dealt an unjust hand, given that its emission contribution oscillates around a mere percentage, yet it has paid the price for the polluting habits of more industrialized countries. There needs to be 'climate justice' whereby the poorer countries are helped by the more polluting countries to build holistic and sustainable green mechanism within their socio-politico-economic eco systems to safeguard against such future eventualities to the extent possible.

Pakistan is likely to be faced with fluctuating and paradoxical natural calamities such as alternating cycles of flooding and drought because of its unique situation as a longitudinal country with deserts, coastline, and the largest number of glaciers after the Arctic. Pakistan has zealously engaged with all international stakeholders at international climate forums and is signatory to all major international covenants.

Therefore, most of the pre-requisite climate actions have been fully adopted as national priorities, though they may not have been implemented yet. These need to be fast-tracked not only to safeguard our own environmental interest but also to remain relevant in the comity of nations as a climate-responsible country.

Though the government is currently engaged in immediate relief and rehabilitation activities in connection with flood-related devastation, there is a clear opportunity to address a truly sustainable climate theme running across its rebuilding and rehabilitation efforts. There needs to be a deliberated and consensual effort to set up sustainable governance models at the outset so that the climate aspirations may crystalize into sustained long-term, systemic structural mitigating safeguards against future climate-change shocks.

Greening of the CPEC: Opportunities for Pakistan

Pakistan is standing at a critical and opportune juncture, as it is in the process of accomplishing large infrastructure and energy projects under the CPEC umbrella as a key strategic ally of China in the context of the Belt and Road Initiative. However, the geopolitical turmoil driven by the regional conflicts had both immediate and adverse socio-economic impacts on Pakistan's energy sector. On the one hand, it imperiled the economic recovery from COVID-19, and on the other inflation, energy, food in-security, and disruptions in energy supply chain are among the current challenges faced by the decision makers. The investment delays and shifts under Belt and Road Initiative (BRI) are the apparent examples of these disruptions. However, where these challenges have halted the development of energy projects in Pakistan, they have also provided Pakistan an opportunity to re-evaluate its needs, and what should be driven forward in the existing scenario of increasing debt situations in Pakistan. A potential way forward from this debt and crisis for Pakistan lies in looking into the opportunity to explore the potential of clean energy transition under the CPEC investments, recognizing China's biggest market of renewables and investments driving the transition in BRI countries, and thus reducing overall energy cost in the long run. Although the past year has depicted a strong commitment from China in greening the CPEC, this report outlines major opportunities and pathways for clean investments under the initiative which could lead to the development of low-carbon and sustainability-led development projects for Pakistan.

Objective and Methodology of the Report

The key outcome of the report is to recommend a pathway that can support the green development of energy sector projects under China Pakistan Economic Corridor (CPEC) with the eventual aim of mobilizing the green investments through public and private sector, and development partners. It deliberates on lessons of experience from similar projects while assessing the ripeness of the existing ecosystem and enabling the environment to embrace an ethos of greening through multifarious approaches and leveraging the collaborative learning opportunity with China.

The development of this report, recommendations, and the action plan followed the following approach:

Literature and Desk Review: A review of the completed and ongoing projects under CPEC and their governance framework, financing avenues under the Belt and Road Initiative (BRI), Pakistan's Climate landscape and the recent vulnerability and a review of the financing ecosystem for low-carbon development in China.

Case Study Approach: Review of the learnings from an on-ground project that has imbibed the green financing pillars along its journey. This has been achieved through a deep-dive into Jhelum-Poonch Hydropower project implementation by International Finance Corporation (IFC) and its strategy for "Sustainable Hydropower Development".

Stakeholder Consultations:¹ The study also drives its recommendations and analysis from a series of key informant interviews and dialogues conducted with key stakeholders from financing institutions, Chinese and Pakistani developers, private sector investors, and think tanks working on CPEC.

Assessment Framework: To achieve the key objectives of this report, a secondary data analysis approach based on an analytical framework, qualitative assessment of stakeholder consultation, and literature/desk review was employed. The study employed this framework to examine the potential of various financing mechanisms to support the development of energy (particularly clean energy) projects under the China-Pakistan Economic Corridor (CPEC), as well as to analyze the structure of financing opportunities. By utilizing this approach, the study was able to provide a

¹ Conference on "The Need to Switch towards a Greener Future: Lessons from China", Public Private Dialogues on "Greening of the CPEC", Key informant interviews (KIIs).

comprehensive overview of the factors associated with the financing mechanisms identified in the literature, their implementation, and the challenges and opportunities that lie ahead.

Green Financing for large projects under CPEC: Lessons from China

While there are multiple climate ambitions that Pakistan has embarked upon, there is a clear, high-stake opportunity to imbibe and incorporate greening mechanisms associated with the large projects. These would be expected to replicate easily, leveraging the collaborative learning opportunity with China. Moreover, it is the Chinese banks which are providing the bulk of the project finance. China's green banking evolution is at a more mature stage than Pakistan and this on-ground engagement through CPEC can catapult Pakistan's green banking and finance while deepening specialized capital markets for green and blue bonds. However, it is imperative that these efforts are seamlessly tied in with other climate related national priorities and actions to avoid pitfalls of an isolated prognostic which may be working at cross currents with other stakeholders.

While China's banking and finance sector is not comparable to Pakistan's in terms of size or stage of evolution, the journey towards achieving and embedding ESG and greening themes is not different. Pakistan can learn from the challenges and successes of the on-ground experience in China, especially through the banks already engaged in financing CPEC projects. Further, there is a need for institutional linkages to ensure a sustained transfer of this knowledge. This effort can be led by the SBP as the Green Banking Guidelines have not been made mandatory yet. Pakistan's commercial banks can be boarded through avenues such as the Banking Association of Pakistan and NIBAF (National Institute of Banking and Finance). Further, there is a gamut of think-tanks focusing on CPEC in Pakistan and these can provide a useful conduit to impart and disseminate this knowledge collateral.

Green financing frontiers for CPEC

In the light of the unprecedented devastation of the 2022 floods that left the country reeling under a human, social and climatic crisis, there is a growing realization that Pakistan needs to realign its climate change priorities and adaptive development goals. Though Pakistan rightly laments that the global impact of emissions is being disproportionately borne by Pakistan, there's also an awakening that it must mitigate climate effects, especially in the wake of the large CPEC infrastructure projects being erected in the recent past, which otherwise risk contributing to

GHG emissions. A low carbon development pathway under CPEC would require a rapid transition through i) the use of energy transition mechanisms, ii) providing an enabling environment for the involvement of Chinese private sector in VRE (solar and wind), iii) addressing demand side efficiency through technology and knowledge transfer, and iv) promote climate smart municipal services and urbanization

Policy Impact Matrix

Key Action Item	Action Marked / Role	Timeframe
Environmental considerations to be applied across the whole project financial lifecycle, ranging from screening to its decommissioning.	NDRC, Chinese FIs, MoPD&SI	1-2 years
To ensure uptake of RE on behalf of Chinese private sector, there is a need to open communication channels that ensure consensus and uniformity, on-time payments, provisions of liquidity damages, and the sanctity of contracts.	NEPRA, CPPA-G	1-2 years
Strive for green projects under CPEC by preferring environment-friendly projects referred against the traffic light system of BRIGC green development guidance.	CPEC regulatory bodies, Private investors, Chinese FIs, BRIGC	1-2 years
SECP should make Environmental Information Disclosures (EIDs) mandatory for all CPEC companies' financial reporting to ensure that the information related to the potential impact of projects is publicly available and that the public can better assess all the risks associated with the project.	SECP, MoPD&SI	3-4 years
FIs to consider differentiated and risk-adjusted financing conditions for these projects by using financing tools such as commercial guarantees, green bonds, and insurances to provide the necessary support.	SECP, SBP, commercial banks and insurance companies	3-4 years
An ESRM must be demanded by the CPEC project FIs under which their clients can report progress on environment mitigation measures after six months.	SECP, SBP, FIs.	3-4 years
A "grievance redress mechanism" in local language must be accessible to the people that are negatively impacted by the CPEC projects. Communities must be able to directly express their concern to the FIs through this mechanism.	FIs, MoPD&SI, JWGs	3-4 years
"Covenants" to be present in the investment agreements of FIs through which enable them to work with clients to rectify breach of environmental and social agreements and, if need be, to exercise remedies, including calling events of default.	FIs, Project Developers.	3-4 years
Engage Chinese private sector investors to accelerate plans for additional solar and wind capacity at identified sites, and through parallel development of strategically located RE parks.	AEDB, MoPD&SI	1-2 years
To upscale Chinese private sector financing, there is a need to develop a long-term policy for and RE based adaptation and mitigation plans	MoE, MoPD&SI	More than 3 years

SBP should incentivize commercial banks to introduce more innovation in green financial products so that investors have more choice, thereby increasing the use of funds for green projects.	SBP, Commercial Banks	1-2 years
Agree on an exclusion list of projects that cannot be funded under CPEC due to their adverse environment or ecological impacts without an economically feasible mitigation plan.	MoPD&SI, NDRC, JWGs	1-2 years
FIs to ensure that an independent EIA is obtained by the project developers. Based on the equator's principle, a low-risk project requires at least a local EIA while for medium-high risk projects, an international EIA in compliance with international standards (World Bank or IFC) should be obtained and must include disclosure and public participation.	Chinese FIs, private investors, EPAs	1-2 years
Enable cross learnings from China to scale up technologies that recycle ash emissions from coal power plants and coal-based industries.	NEVTA/TEVTA/China Study Centers	3-4 years
Capacity building for FIs, policy makers, and developers on environmental risk evaluation, assessment, and international reporting to be expedited through international collaboration and knowledge sharing.	SECP, NDRC, MoPD&SI	1-2 years
Pakistan needs to learn from the stringent green banking dictates of China and disseminate knowledge among Pakistan's practitioners both in terms of ESRM assessment approaches as well as redressal and remedial measures. The government and regulatory bodies can ensure that the knowledge collateral emanating from these experiences permeate among the Pakistani practitioners through multiple avenues such as consultations and dialogues.	SBP, SECP, CSOs, China study centers	1-2 years
The provincial environmental protection agencies (EPAs) are recommended to establish guidelines for selecting and maintaining appropriate Environmental Flows (EFlows) that align with the Good Practice Handbook on Environmental Flows for Hydropower Projects by the World Bank Group. Furthermore, the EPAs should also create guidelines and standard operating procedures to address emergency shutdown procedures during project operations, which must be included in the Environmental and Social Impact Assessment (ESIA).	DFIs, Provincial Government, EPAs	2-3 years
To ensure that comprehensive environmental and social impact assessments (ESIAs) are carried out for relevant hydropower projects, the terms of reference should incorporate the cumulative assessment requirements and comply with the IFC Performance Standards and the Asian Development Banks Safeguard Policy Statement.	EPAs	2-3 years

1. CHAPTER 1: CPEC AND ITS GEO-ECONOMIC SIGNIFICANCE FOR PAKISTAN

1.1. Belt and Road Initiative

China's Belt and Road Initiative (BRI) focuses on six key economic corridors to build cooperation and connectivity across the world. These corridors include China-Pakistan, New Eurasia Land Bridge, China-Indochina Peninsula, Bangladesh-China-India Myanmar, and China-Central Asia-West Asia. According to estimates, Asia requires approximately \$26 trillion in infrastructure investment till 2030 (Asian Development Bank 2017), and China can potentially contribute a significant portion through its investments and infrastructure construction to positively impact the countries and for mutually assured benefits. From a Chinese perspective, this initiative foresees market development for China's products in the long term and to alleviate industrial excess capacity in the short term. **Figure 1** shows a comprehensive overview of the economic corridors, the infrastructure projects such as ports and railroad connections as well as the ultimate geo-tactical ambitions.

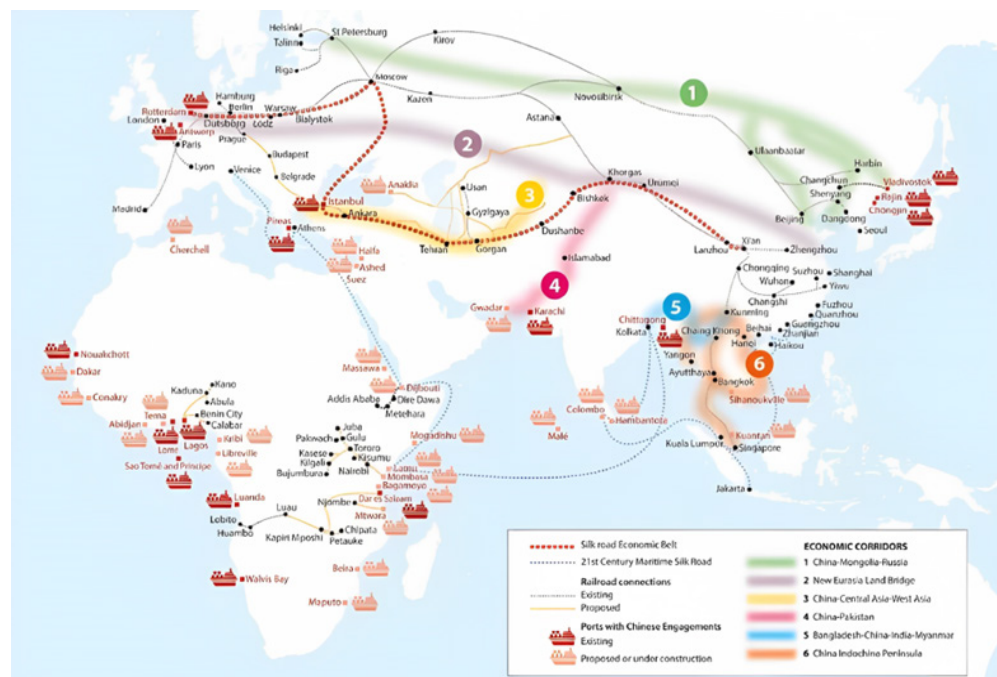


Figure 1 Map of One (land) belt and One (maritime) road (Organization for Economic Co-operation and Development, 2018)

China-Pakistan Economic Corridor (CPEC) is one of the most important projects under the BRI with a framework of regional connectivity zeroing in on Pakistan-China economic and infrastructure nexus. The project manifestly articulates

Pakistan's geo-economic ambitions while boosting regional trade, infrastructure connectivity and strategic alliances. CPEC is anticipated to not only benefit China and Pakistan, but it is also expected to have a positive impact on the economies of Iran, Afghanistan, Central Asian Republics, and the rest of the region. The interconnectivity of geographical linkages through improved road, rail, and air transportation system with frequent and un-fettered exchanges of growth and people-to-people contact is looked on with much hope by Pakistan for enhancing academic, cultural, and regional knowledge and culture, activity of higher volume of flow of trade and businesses, producing and moving energy to have more optimal businesses and enhancement of co-operation through a mutually beneficial model. The multitude of projects under this ambitious programme are expected to fulfil Pakistan's economic and security aspirations to have a well-connected, integrated region of shared destiny, harmony, and development.

1.2. Governance Framework for CPEC in Pakistan

While the operationalization and implementation of CPEC projects broadly rests with the Ministry of Planning, Development and Special Initiatives, its governance structure encompasses significant stakeholders in Pakistan to ensure the future success and sustainability of its operations (CPEC Authority 2022). An overarching Joint Cooperation Committee (JCC), which comprises Planning Minister, NDRC Chairman and his Chinese counterpart, Below this overarching structure, there are joint working committees for each of the pillars identified in **Figure 2**. Status of various projects under these pillars are further described in **Annexure 1**.

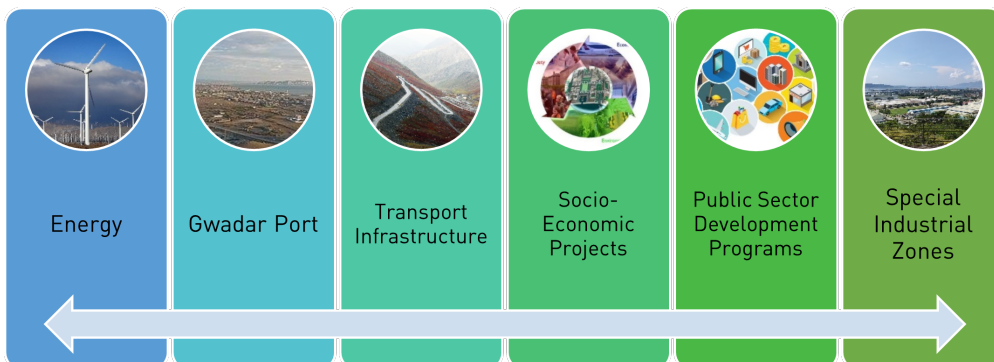


Figure 2 CPEC Joint Working Committees

1.3. CPEC and Sustainability

“We need to seize opportunities presented by the new round of change in energy mix and the revolution in energy technologies to develop global energy interconnection and achieve green and low-carbon development. We should improve trans-regional logistics network and promote connectivity of policies, rules and standards so as to provide institutional safeguards for enhancing connectivity.”

(Embassy of People’s Republic of China, 2023)

The above quote from the highest authority in China articulates how the BRI and under it, the CPEC aspires to adopt and move forward with green friendly and sustainable policies, adaptable in a contemporary context. China’s Ministry of Ecology and Environment further elaborates that China would improve green and low carbon development through eco-industrial parks and service platforms across the BRI (Organization for Economic Co-operation and Development 2018).

For Pakistan, CPEC has been a strategic economic breakthrough due to its immense geopolitical importance and a large investment. Contrary to presuppositions about large infrastructure projects, CPEC has not put greening on the backburner, but consistent with its stated policy, contributed to high-quality green and sustainable development in Pakistan.

Green and clean energy has been a prominent feature of CPEC energy developments. Wind power projects with a total capacity of 300 MW and a solar power plant of 1000 MW have already been completed. Hydropower projects (such as Karot - an under construction large dam on Jhelum River) have also contributed to the capacity expansion. Further, the Matiari-Lahore power transmission line has helped in reducing energy loss and improving efficiency of the power systems. Green and sustainable development is also generating significant employment opportunities in Pakistan. A statistical analysis by a think-tank shows that CPEC has created more than 85,000 jobs for Pakistan in its early harvest projects (Business Recorder 2020).

China and Pakistan have been collaborating to establish a green corridor that prioritizes agriculture, environment, food, climate change, and food security, in

response to the increasing emphasis on sustainable development. All stakeholders are working towards and hoping for a fast-paced completion momentum for the project that are in progress or in pipeline so that CPEC can duly materialize its ultimate objectives of rapidly upgrading Pakistan's pre-requisite infrastructure and strengthening its economy through the boons associated with modern transportation networks, augmenting energy generation capacity and spurring industrial growth of multiple sectors through special economic zones.

Given the significant scale of projects under CPEC, it is imperative to leverage the opportunity to embrace green practices and adopt methodologies to ensure their sustainability through solid governance structures. The learnings will have policy implications on the way Pakistan approaches its sustainable development aspirations, be it the government, private sector, academia, or regulators. There is an opportunity to leverage the Chinese collaboration and imbibe replicable practices. China is ahead of the curve in terms of its evolution in sustainable finance. It is ranked as a maturing market compared to Pakistan which is at the 'Implementation' stage by the Sustainable Banking & Finance Network (SBFN).

1.4. Financing under Belt and Road Initiative

The main funding sources for the bulk of BRI projects include the Chinese Development Banks, the Silk Road Fund (\$40 billion), and two large state-owned commercial banks (ibid). Further, some of the host governments have also joined the financing consortiums as shown in **Figure 3**.

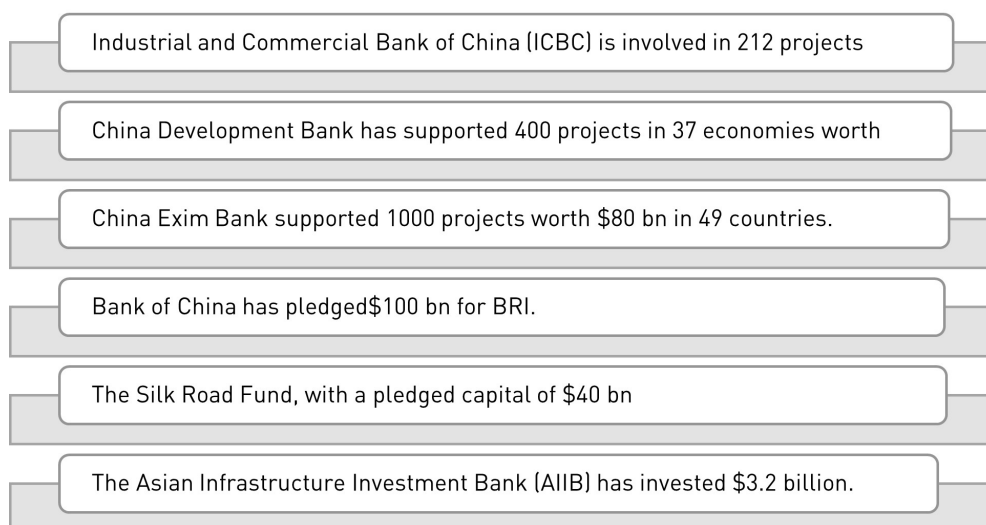


Figure 3: Consortium for financing of the Belt and Road Initiative [Euromoney 2017; Jeremy Page 2020; Asian Infrastructure Investment Bank, 2022]

Particularly for the CPEC, the loans for Pakistan are disbursed through Exim Bank of China, China Development Bank and the ICBC. Joint Chinese-Pakistani firms will be responsible for constructing power sector projects instead of the governments of China or Pakistan. These investments will be financed by the Exim Bank of China at an interest rate of 5-6%, and the Pakistani government will have a contractual obligation to purchase electricity from these firms at pre-negotiated rates (Shoab ur Rehman 2015). Meanwhile, most of the large and mid-sized Pakistani banks (including Habib Bank Ltd, United Bank Ltd, Muslim Commercial Bank, and Askari Bank) have opened special departments for China-related projects.

Investments for energy projects till 2021 for completed and under-construction projects are indicated in [Figure 4](#).

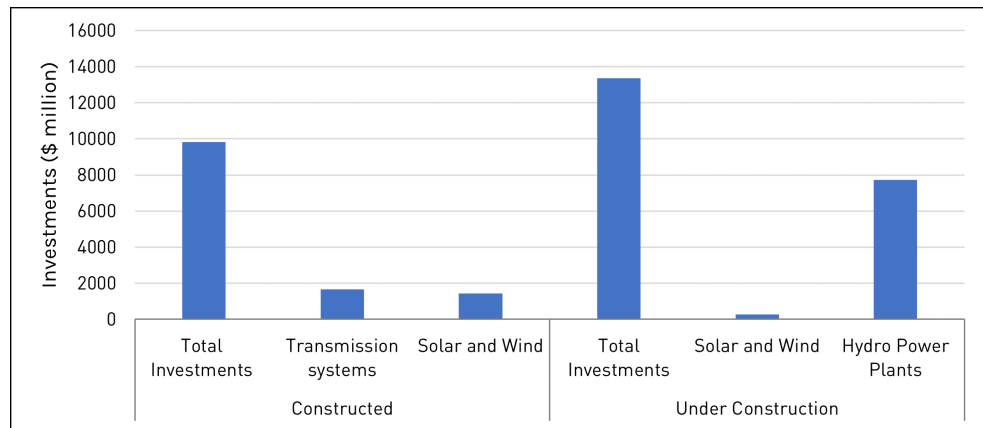


Figure 4: Investments in completed and under construction energy projects of CPEC
 [Source: Figure designed by authors based on data collected from CPEC Authority]

Lessons and Policy Implications from some CPEC Projects

Sahiwal Coal Power Plant: This project that is located in the Punjab heartland has an installed capacity of 1320 MW and commenced full operations in July 2017. The bulk of the financing was done by ICBC Bank which required a comprehensive environment assessment report as part of the credit cycle as well as a remedial plan. The information centered on emissions, water availability, ash residue, etc. Although the plant operates on carbon intensive coal, as part of the 'greening plan', the ash residue was converted to low-cost bricks which had a two-fold benefit of evading the ash emission as well as creation of a low-cost housing construction source through ash bricks.

- **Policy Implication:** There is great scope to scale up such technologies to recycle ash emissions in not just coal power plants but other industries where ash or similar by-products occur. This is an area where Pakistan can incorporate Chinese innovation for local solutions that address not only the emission conundrum but also reduce environmental risk by opening an avenue to provide a low-income construction resource.
- **Suki Kinari Hydro Power Plant:** This is an under-construction, run-of-the-river hydropower project located on the Kunhar river in the Kaghan Valley, Khyber Pakhtunkhwa, with an installed generation capacity of 874 MW. It is being built in collaboration with China's Gezhouba Group. The major financiers were Exim bank of China and ICBC. The environment report showed risks such as landslides and re-populating communities among others as the project entailed around 21 kms downstream work. As Chinese Banks adhere to regulations prevalent in China primarily (more stringent) and Pakistan, a remedial plan was implemented which included development of model villages for around 15,000 homes. These were sustainable, low-income houses incorporating solar energy. In terms of pricing, the loan to the Sahiwal coal power plant was significantly above that of SK Hydro (approximately 4-5% above LIBOR compared to 1-2%).
- **Policy Implication:** Bankers with experience at ICBC and CDB strongly supported that a pricing differential must reflect the ESR of projects. This is a regular practice for Chinese financiers, but Pakistani banks are yet to fully implement this concept, being driven at times by more commercial considerations. The recently launched ESR guidelines by the Central Bank will surely make a way. This can be an effective carrot and stick policy to nudge project management to embrace green practices.

2. CHAPTER 2: PAKISTAN'S ENVIRONMENT PROFILE AND CLIMATE RISK MILIEU

This section provides a snapshot of Pakistan's geomorphology with the objective of understanding the nuanced climate change vulnerabilities in different regions to be able to suggest bespoke and customized strategies and policy measures towards prognostic development goals. This climatology is also important while considering the physical sites for many of the CPEC projects, especially large hydro and the VRE. Some of the later examples such as that of a solar park show that some project pitfalls could have been avoided through better assessment of the localized climatic topography versus required optimum. Further, if we are to look at the potential greening of CPEC projects, it is imperative to understand the lay of the land and understand Pakistan's situation vis-a-vis its unique challenges, the regulations thus far and the ESG related goals it aspires to accomplish. The CPEC journey needs to be seen in this contemporary context.

2.1. Pakistan's Climate Landscape

2.1.1. Environment Profile

Key features describing Pakistan's climate landscape are summarized in Table 2.

Table 1: Key aspects describing Pakistan’s Climate Landscape

Sr. No	Parameter	Description
1	Average monthly temperatures	In 2022, the national mean temperature for Pakistan surpassed the 1961-1990 average by 0.84°C, ranking it as the fifth warmest year on record in the past 62 years (Pakistan Metrological Department 2022). Pakistan experiences warming rates that are significantly higher than the global average with a potential increase of 1.3°C to 4.9°C by the 2090s based on the 1986-2005 baseline (ibid). The influence of El Niño is evident in Pakistan's climate variability, which results in temperature anomalies. The warming trend in Pakistan was estimated at 0.57°C in the 20th century, which is slightly lower than the South Asia region’s average of 0.75°C (Climate Knowledge Portal 2021). However, warming has accelerated in recent times with 0.47°C of warming recorded between 1961-2007. The warming trend is particularly pronounced in winter and post-monsoon months (November-February). Further estimates indicate that by 2030, the temperature of Pakistan will rise by 1-degree using 2000 as the base year (International Science Council 2021).
2	Rainfall & Precipitation	Rainfall in Pakistan exhibits significant inter-annual variation, resulting in a pattern of alternating floods and droughts. The mean rainfall in the arid plains and coastal areas of Pakistan has declined by 10%-15% since 1960, contributing to the deterioration of wetlands and mangrove ecosystems (Interactive Country Fiches 2022). The small farmers, who form the backbone of Pakistan's agrarian economy, are particularly vulnerable to the paradoxical cycles of droughts and floods, raising concerns about food security. It is projected that the number of people affected by floods will increase in the future, with an estimated 5 million people likely to be exposed to extreme river floods by 2035-2044, and a potential increase in coastal flooding of around 1 mm per year by 2070-2100 (ibid).

3	Melting of the Glaciers	With over 7,200, Pakistan has more glaciers than any other region outside of the polar areas (Tim Craig, 2020). The increasing temperatures, which are connected to climate change, are causing many of these glaciers to melt prematurely, resulting in additional water being added to rivers and streams that are already swollen due to rainfall.
4	Temperature forecasts	Pakistan is expected to experience significantly higher temperature increases than the global average. According to the IPCC, the highest emissions pathway (RCP8.5) could result in a global temperature increase of 3.7°C by 2081-2100 (Climate Knowledge Portal, 2021). However, the model ensemble predicts that Pakistan's average temperature could rise by 5.3°C under the same scenario.
5	Heatwaves	During the months of March to May 2022, the plain areas of the country experienced six heatwaves, resulting in scorching temperatures that were significantly above average, ranging from 8°C to 12°C higher than normal (Pakistan Metrological Department, 2022).
6	Strong winds and windstorms	In 2022, there were over 80 events with strong windstorms (30 knots or above) just in the month of March (ibid).

On the emissions front, energy sector is currently Pakistan’s largest carbon-intensive sector, emitting approximately 211 Mt CO₂-eq in 2021. It contributes a share of approximately 48% in total GHG emissions. Share of different subsectors in total emissions is further depicted in [Figure 5](#).

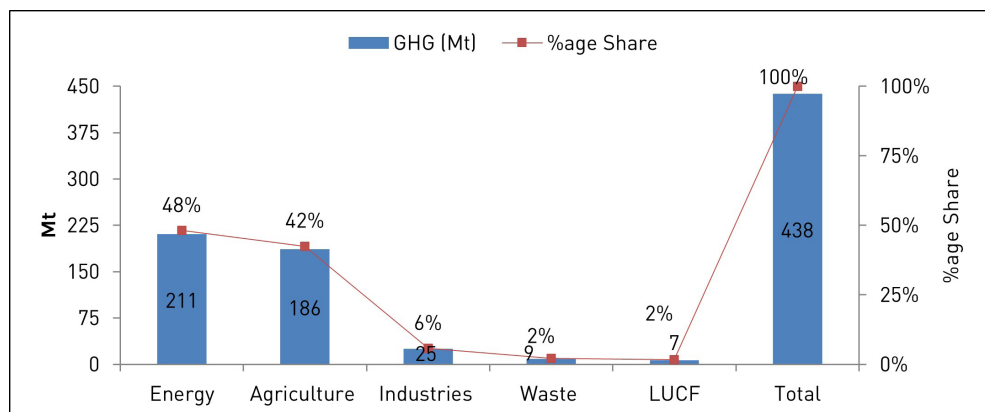


Figure 5: Share of different sectors in total emissions of Pakistan
(Aslam, H., Zia, U.; 2022)

While the total of emissions of Pakistan have substantially increased over the past decade, the country is still contributing less than 1% in global carbon emissions, making it a low-carbon footprint economy.

2.1.2. A brief on Environmental Laws of Pakistan

The Pakistan Environmental Protection Act of 1997 was the primary law governing environmental protection till the passage of the Eighteenth Amendment Bill, 2010. The establishment of Environmental Protection Agency (EPA) under this Act enabled the issuance of various rules, regulations, standards, and guidelines for safeguarding the environment, including the NEQs, IEE and EIA regulations. However, with the Eighteenth Amendment, the Concurrent Legislative List (CLL) of the Constitution, 1973 was abolished, leading to the transfer of "Environmental pollution and ecology" to the legislative purview of the Provincial Assemblies. EPA will continue to exercise its powers under PEPA, 1997 for projects related to the Armed Forces of Pakistan or those with adverse environmental effects that are transitional or inter-provincial in nature. The EPA exercises its jurisdiction over all major economic and industrial centers such as Cantonment areas and authorities, communications infrastructure, nuclear energy production and infrastructure, mining, gas production, etc.

Rules and Regulations of Federal EPA

By virtue of the powers granted to it under section 12 of PEPA, 1997, the Federal EPA has issued the IEE and EIA Regulations-2000. The purpose of conducting an environmental assessment is to enable project proponents, decision makers, and members of the public to understand the environmental impacts of the proposed project and to minimize the adverse effects wherever possible while considering the costs and benefits of utilizing environmental resources. The approval of an IEE/EIA may be subject to certain conditions, in which case the proponent is required to prepare an Environmental Management Plan (EMP) outlining the measures and procedures to mitigate the identified impacts. It is essential to integrate environmental assessments into the project cycle at the appropriate stage. The IEE should commence at the pre-feasibility stage or at the latest, at the outset of the feasibility stage. Otherwise, it should start with the feasibility study, and the results of the environmental assessment must be factored into other parameters of the feasibility stage such as technical, financial, and economic studies. The categories of activities for which an IEE or EIA is required are broadly Agriculture & Fisheries,

Energy, Manufacturing & Processing, Transport, Mining, Water Management, Waste Disposal, Construction, and many others. Detailed lists can be found at the EPA website as well as the State Bank of Pakistan's Green Banking guidelines (State Bank of Pakistan 2017) whereby specific information is disseminated to financial institutions while assessing large project financing.

It is imperative for financiers to acquaint themselves with the United Nations Convention on the Law of the Sea (UNCLOS) and the Convention Concerning the Protection of the World Cultural and Natural Heritage. The National Environmental Quality Standards (NEQSs), which were initially introduced in 1993 and later amended in 2000 and 2010, serve as national benchmarks for pollution levels set by industries, which are subject to measurement, monitoring, and must not be exceeded. The NEQSs classify effluent levels into subcategories such as liquid, gas, or other. Since no IEE or EIA can be requested for already established industrial units, compliance with NEQSs is automatically enforced for existing projects. The Federal EPA established a self-monitoring and reporting program (SMART) in 2006, which has shifted the responsibility of NEQSs compliance to the industrial units. Additionally, the Ministry of Law & Justice has set up Tribunals in Karachi and Lahore. Moreover, sectoral guidelines can be found on the EPA website as well. List of Federal EPA rules for banks/DFIs are attached as [Annexure 2](#).

Multilateral Environmental Agreements

Pakistan has signed and ratified all of the MEAs, conventions, and protocols that it is a party to. As a result, it is the responsibility of the state to ensure that these endorsed agreements are implemented. Banks and DFIs are encouraged to familiarize themselves with these MEAs, link them to the actions of their clients, and incorporate compliance with them into their standard due diligence processes as a part of their due diligence procedure.



Figure 6: Pakistan's multilateral Environmental Agreements

2.1.3. Climate Financing in Pakistan

As per the updated Nationally Determined Contributions, Pakistan's annual adaptation needs are around \$7-14 billion per annum (Government of Pakistan 2021). For mitigation, only the clean energy transition in Pakistan requires \$101 billion by 2030 and additional \$65 billion by 2040. Further, as per the Country Climate and Development Report, total financing needs of Pakistan in are \$234 billion with subcategorization as shown in Figure 7 (World Bank Group 2022).

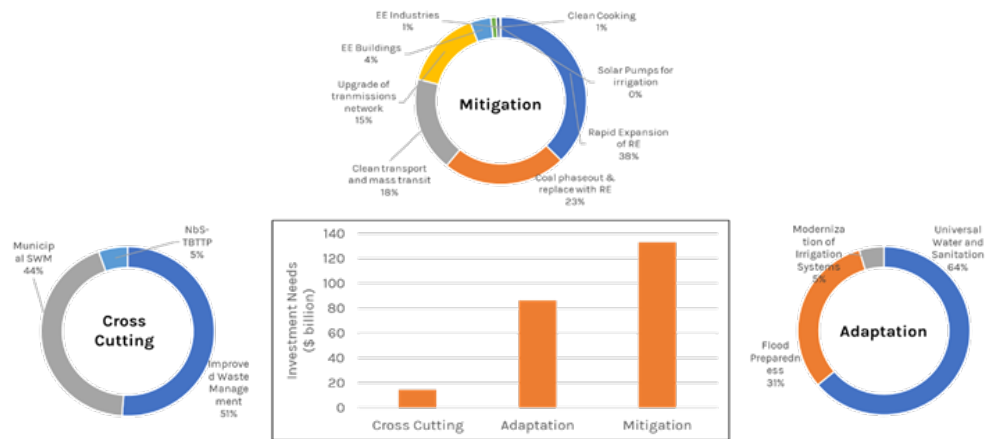


Figure 7: Pakistan's Climate financing needs [Figure designed by Authors based on data collected from CCDR (ibid)]

On the supply side, climate finance in Pakistan is sourced through both public and private sectors, with the contribution of \$28.3 billion and \$25.2 billion respectively. Subcategorization of these sources is further described in Figure 8. Pakistan's Total allocations for climate change in Budget 2022-23 (under PSDP) is PKR 9.6 billion (which is 0.10% of total budget, and almost PKR 4.7 billion less than previous year). Climate favorable and Climate non-favorable investments under the budget are further elaborated in Annexure 3.

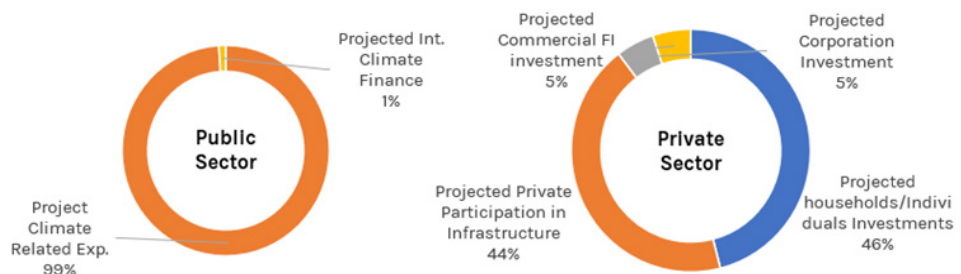


Figure 8: Climate finance resourcing in Pakistan [Source: Figure designed by Authors based on data collected from CCDR (ibid)]

2.2. Pakistan in Climate Risk Milieu

2.2.1. Pakistan's Climate Vulnerability

According to German Watch's 2021 assessment, Pakistan was ranked the 8th most susceptible country to climate change (Germanwatch 2021). In addition, the country has experienced some of the highest disaster risk levels worldwide, ranking 18th out of 191 countries in the 2020 Inform Risk Index (World Bank Group, 2020). This ranking is primarily due to Pakistan's exposure to earthquakes, cyclones, risks

of internal conflict, flooding, and drought. Pakistan is highly vulnerable to various forms of flooding, including riverine, flash, and coastal (jointly ranked 8th), as well as to tropical cyclones and their associated hazards (jointly ranked 40th) and drought (jointly ranked 43rd). The nation's social vulnerability also contributes to its disaster risk, with a vulnerability ranking of 37th driven by high levels of multidimensional poverty. Consequently, these impacts have halted Pakistan's progress on different SDGs as shown in Figure 9.

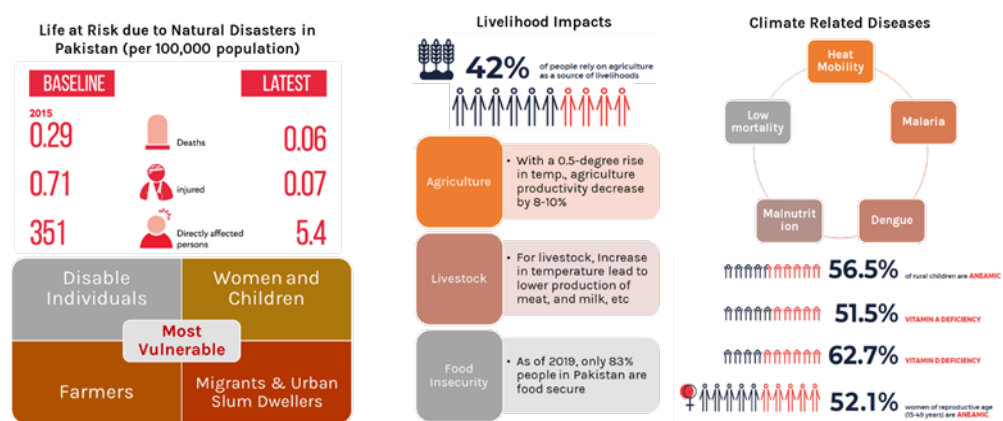


Figure 9: Impact of CC impacts on sustainable development of Pakistan
 [Figure designed by authors based on data collected from SDG Progress Report 2021
 (Government of Pakistan, 2021)]

2.2.2. Floods in 2022

The year 2022 was a tumultuous time, which brought to the fore Pakistan's climate vulnerability like no other-a year that left it reeling from unprecedented floods and other climate devastation with an initial estimate of damages and economic losses at about \$ 30 bn and rehabilitation and reconstruction needs of at least \$ 16.3 bn (World Bank Group 2022)². These floods have impacted 33 million population in Pakistan with an estimated life and infrastructure loss as given below.



The 2022 floods are predicted to have a severe negative effect on the country's economy, worsening its vulnerability. Resulting from the floods, the gross domestic product (GDP) loss is estimated to be about 2.2 per cent of FY22 GDP (ibid).

2 <https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme>

The agriculture sector is expected to experience the most significant decline, equivalent to 0.9 per cent of GDP. The impact on agriculture could also have ripple effects on other sectors such as industry, external trade, and services. However, as reconstruction and recovery spending increases, the loss in output could be reduced.

Although the process of recovery will necessitate significant efforts to restore damaged infrastructure, buildings, and livelihoods, it also presents an opportunity to fortify institutions and governance structures by prioritizing sustainable practices. This includes incorporating green solutions into all aspects of infrastructure development and emphasizing capacity building to promote climate resilience and adaptation. Stakeholders need to recognize that without a framework that embeds climate preparedness through multi-pronged approaches that leverage public policy; corporate responsibility; green financing mechanisms; sectoral emphasis on clean technology; academic thought leadership; and smart agriculture techniques, Pakistan will forever remain embroiled in a vicious cycle of one climate disaster to another.

The post-Disaster Needs Assessment was led by the Ministry of Planning, Development, and Special Initiatives, in collaboration with the Asian Development Bank (ADB), the European Union (EU), and United Nations agencies, with technical assistance from the United Nations Development Programme (UNDP) and the World Bank (Ministry of Planning, Development, and Special Initiative, 2022). It revealed that the national poverty rate could rise by 3.7 to 4.0 percentage points, which could result in an additional 8.4 to 9.1 million people falling below the poverty line. Furthermore, multidimensional poverty could increase by 5.9 percentage points, which could put an additional 1.9 million households at risk of falling into non-monetary poverty. Thus, along with environmental degradation, climate change is also a national security threat for Pakistan with impacts on various sectors further highlighted in [Figure 10](#).

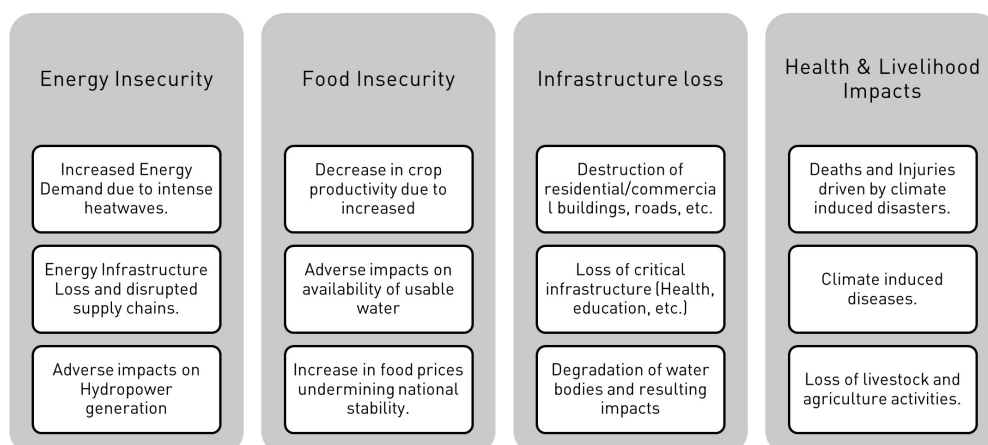


Figure 10: Climate change and the threats to national security

Policy Implications and Lessons Learnt

Pakistan’s development goals are inextricably linked to timely and holistic climate change strategies without which no policy can be successful on a standalone basis. With the ongoing CPEC projects, the time to implement this policy vision is now and permeate this cross-cutting theme to these large-scale projects and replicate the success elements in other national projects. Further, the discussion contextualizes Pakistan’s unique position in terms of its climate change vulnerabilities, the clear and present danger of further ravages and an overview of the existing environment management visions in terms of regulations. It is imperative that the stakeholders in Pakistan stay abreast of the fast-changing global regulations and trends as well as local exigencies to create a mechanism whereby bespoke changes can be fluidly incorporated. To address this challenge, this section proposes a set of key recommendations that can be applicable under the overarching theme of mitigating and adapting to climate change and addressing greening of the CPEC.

Developing a Regulatory Sandbox: To stay abreast of the fast-changing global regulations, there is a need to create a ‘Regulatory Sandbox’, as getting ratifications through a government/parliamentary process can be cumbersome. For this, responsible industry bodies would have to be on board for consensus building as well as for ‘piloting’ such regulations before adoption.

Greening of the Financial Sector: The CPEC projects are mostly financed by Chinese Banks which follow the more stringent green banking dictates present in China. There is a massive opportunity to learn from these practices and disseminate among Pakistan’s practitioners both in terms of ESRM assessment approaches as well as redressal and remedial measures. The government and regulatory bodies can

ensure that the knowledge collateral emanating from these experiences permeate among the Pakistani practitioners through multiple avenues such as consultations and dialogues. International development bodies can also play a role here while regulatory bodies and think tanks can steer this thought leadership. Further, policy makers need to holistically strive to green the financial sector, including through financial regulation, taxonomies, reporting and disclosure standards, and the development of green financial tools and instruments.

Sustainable Agriculture: Special attention should be given to agriculture, which serves as the backbone of the economy. To meet changing demands, there is a need to improve and modernize irrigation and drainage systems to provide climate-resilient, predictable, and flexible services. This can be achieved through investing in infrastructure to enhance hydraulic control and flow measurement besides improving water allocation practices and implementing better water measurement, billing, and collection processes. Starting with surface irrigation water tariff would be a good starting point.

Decarbonization of demand sectors: From a state-level policy approach, industrial and decarbonization is highly important and can be achieved through the following approaches:

- Encourage the adoption of carbon, energy, and water-efficient technologies and production processes. The most urgent priority should be to replace outdated and inefficient motors and appliances.
- Encourage the use of electricity and improve fuel efficiency by implementing waste heat recovery and switching to sustainable sources like bioenergy and green hydrogen.
- Pilot and adopt innovative technologies for hard-to-abate industrial processes such as cement production.
- For the transport sector, the key interventions include:
 - Accelerate large-scale investment in mass-transit solutions and Electric Vehicle supply chain.
 - Focus on public transportation infrastructure while simultaneously bringing in regulations and incentives for greener technology such as Electricity, biodiesel, hydrogen.
 - Facilitate the revival of Railways and consider private sector involvement while providing concessions to operate freight trains on Pakistan Railways track. Develop new rail links; upgrade and restore existing rail links.

3. CHAPTER 3: SEIZING CPEC OPPORTUNITY: LEARNING FROM CHINA'S SUSTAINABILITY & GREEN FINANCE JOURNEY

With the advent of the change enabling CPEC projects in Pakistan, there is an opportunity to learn from and imbibe green practices that have been in place in China in recent years. Though there is a part of CPEC dedicated to establishment of a two-way knowledge corridor through shared experiences and academic interaction, we are exploring here the opportunity to learn through on ground project implementation and collaboration. For this, it is necessary to explore the sustainability model that exists in China and the learnings along the way, both in terms of replicable successes and issues to address differently. The financial system is vibrant in terms of embracing sustainability concepts. As most of the CPEC projects are financed by Chinese banks, it's pertinent to understand the structure and governance principles of the Chinese financial regime. The projects on ground under CPEC are subject to the ESG (Environment, Sustainability and Governance) mandate of the financier banks.

3.1. China's Financial Ecosystem

3.1.1. Overview

Initially, the China's banking system was completely owned by the People's Bank of China (PBoC), which then became the central bank of the People's Republic of China (PRC). After China's economic reforms during the late 1970s and early 1980s, the country gradually opened its banking industry to embrace diversified ownership and businesses. In the early 1980s, the government allowed the four state-owned specialized banks to accept deposits and conduct banking business, which were Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BoC), and Agricultural Bank of China (ABC). The Bank of Communications (BCM) was restructured into the first state-owned joint-stock commercial bank and opened for business in 1986. Since then, ICBC, CCB, BoC, ABC, and BCM have established themselves as the country's five largest commercial banks. Since 2014, the government has also been encouraging private capital to participate in the financial sector, and as of now, 19 privately owned banks, including Zhejiang E-Commerce Bank and Shenzhen WeBank, have been approved.

China established three policy banks in 1994 to provide special lending services for construction projects, import and export companies, and the agricultural sector.

Foreign banks are permitted to establish subsidiaries and branches in China and make strategic investments in Chinese-funded commercial banks. As of December 2021, the total assets of the Chinese banking system were ¥381.95 trillion (approximately US\$52 trillion), with the five largest commercial banks controlling 39.3 per cent of the total assets (People's Bank of China, 2021). The China Banking and Insurance Regulatory Commission (CBIRC) (previously known as the China Banking Regulatory Commission (CBRC)) primarily supervises and regulates banking business, along with the central bank, the PBOC, which is responsible for formulating and implementing monetary policy. Additionally, non-banking financial institutions such as trust companies, financial leasing companies, foreign exchange companies, consumer financial companies, and automobile financial companies are also under the CBIRC's administration.

3.1.2. Regulatory regime for the banks

Under the PRC Law on Regulation and Supervision over Banking Industry (Banking Regulation Law), companies planning to conduct banking business or take deposits in China must obtain approval from the CBIRC. The CBIRC was established by merging the CBRC and the China Insurance Regulatory Commission to improve financial regulation efficiency and eliminate regulatory arbitrage.

Banks in China are divided into two categories, namely Chinese-funded banks, and foreign-funded banks. The division is based on the status the bank gained at its establishment. If foreign investors invest in an established Chinese-funded bank, that bank would retain its original status as a Chinese-funded bank in terms of supervision and regulation by the CBIRC.

Financial institution issuers, such as policy banks, commercial banks, finance companies, and financial institutions with legal person status within China, must obtain PBOC approval to issue financial bonds. Foreign-funded banks are qualified to engage in debt trading in the CIBM under the Foreign-Funded Banks Regulations. Additionally, overseas institutions incorporated outside of China are permitted to issue bonds, also known as Panda bonds, subject to fulfilling certain conditions and requirements. China's financial system is sophisticated and vibrant, with an enabling environment for sustainability approaches and instruments.

Currently, all types of issuers except financial institutions are required only to register with the National Association of Financial Market Institutional Investors (NAFMII), a self-regulation body. Nonetheless, overseas financial institutions face

stricter requirements when issuing Panda bonds and must satisfy the new Panda bond measures and other related regulations.

3.2. China's Sustainable Financing Journey

3.2.1. China and Sustainable Banking and Finance Network (SBFN)

China has been working with the SBFN to incorporate sustainability pre-requisites in its financial system and is at the “Maturing/Consolidating” stage while Pakistan is among the majority of countries at the “Developing/Implementation” stage. SBFN was established in 2012 and is a community of financial sector regulators and industry associations from emerging markets, working in collaboration with the IFC (International Finance Corporation) to advance sustainable finance in line with international good practice and national priorities. As of October 2021, the SBFN has a membership of 63 institutions from 43 countries, representing \$43 trillion or 86 per cent of the total banking assets in emerging markets (Sustainable Banking and Finance Network, 2021). The SBFN is committed to two primary objectives: improving the management of environmental, social, governance, and climate change risks in financial sector activities, and increasing capital flows to activities with positive environmental and social impacts, including climate change mitigation and adaptation.

In China, the main counterparts for the SBFN are the CBIRC, China Banking Association, Ministry of Environment and Ecology, as well as PBOC and Ministry of Finance. The national sustainable finance framework in China originated in the banking sector and has now expanded to include insurance, capital markets, and asset management. The framework includes clear supervisory expectations for FIs to integrate ESG risk management and increase green finance flows, supported by detailed implementation guidelines and tools, and robust monitoring mechanisms.

Annually, the banking sector reports and assesses consistent and authoritative data on ESG risk management and sustainable finance flows, providing insights into the financial performance and environmental benefits of sustainable banking activities. With China's commitment to peak carbon emissions by 2030 and achieve carbon neutrality by 2060, climate risks have become a focus for market-wide capacity building and potential regulatory action (Wang et al. 2022).



Figure 11: China's Banking Sustainability Journey

[Figure designed by authors through data collected from different resources]

3.2.2. Integration of Environmental, Social and Governance (ESG) systems

Strategic Alignment

China has implemented a national sustainable finance framework that goes beyond the banking sector and aims to promote the integration of environmental, social, and governance (ESG) considerations across the entire financial sector ecosystem. There has been extensive collaboration among agencies, resulting in frameworks that align with national strategies and international best practices. Within this framework, China has established guidelines such as the Green Credit Guidelines (2012) and Guiding Opinions on Supporting the Development of Green Bonds (2017) that allow for the integration of ESG risks and performance into the operations and activities of financial institutions (FIs).

In addition, the Key Performance Indicators for the Implementation of Green Credit (2014) reference international initiatives such as the Equator Principles, UN Global Compact, and UNEP Finance Initiative. This framework has been developed and implemented with close consultation with the financial sector, and the China Banking Regulatory Commission (CBIRC) issued the Green Credit Key Performance Indicators and instructed the China Banking Association (CBA) to establish a professional committee for green credit business. Furthermore, the CBA issued the China Banking Industry Green Bank Evaluation Implementation Plan in 2017.

Regulatory and Banking Association Action

The sustainable finance framework in China is complemented by practical tools and guidelines, such as the Green Credit Statistics System, which assists banking institutions in categorizing their green credit portfolios, and the Green Credit Key Performance Indicators, which help them perform self-assessment of their green credit implementation. In China, 21 major banks, representing 70 per cent of national banking assets, have established internal ESG governance structures and policies and provide regular reports to CBIRC on their ESG performance and activities. CBIRC updated its Green Credit Statistics System in 2020 by adding indicators on financing for climate change mitigation and adaptation. In 2021, CBIRC introduced a draft Corporate Governance Code for Banking and Insurance Institutions, which calls for banks and insurers to consider ESG factors such as environmental protection and social responsibility.

Expectations for Financing Institution Actions

The Green Credit Key Performance Indicators mandate that FIs create policies and procedures to manage ESG risks and performance, regularly review and monitor ESG risks, and make public reports on their ESG performance. In 2020, CBIRC released Guiding Opinions to promote high-quality development in the banking and insurance industry, calling for China-based banks and non-banking financial institutions to establish and enhance their environmental and social risk management systems, incorporate ESG requirements throughout their credit granting processes, and improve ESG-related information disclosure, reporting, and stakeholder engagement. It also advocates for the creation of green finance franchised institutions, and encourages the development and innovation of green financial products.

An Overview of ESG Ecosystem in Pakistan

China's banking sustainability metrics are more evolving than Pakistan's as the SBFN ranks China among 'maturing' markets while Pakistan along with the bulk of affiliate countries is judged to be at the 'developing' stage. Since CPEC projects are structured and registered as Pakistani companies, this box provides a snapshot of green enabling environment for the companies.

- *SBP Green Banking Guidelines*: The guidelines concentrate on three main aspects:
 - i. Risk management to improve financial stability by comprehending, managing, and reducing environmental exposures of financing portfolios
 - ii. Business facilitation to promote the development of the 'green' market by actively exploring viable business opportunities for financing clean energy and resource-efficient projects.
 - iii. Reduction of own impact to potentially modify the internal operations and procedures of banks and DFIs to lessen their impact on the environment and society.
- Further to GBGs, SBP has also launched the *Environmental & Social Risk Management (ESRM) Implementation Manual* for Financial Institutions in November 2022. SBP also set an *incentive mechanism* for Renewable Energy Projects.
- The Securities and Exchange Commission of Pakistan (SECP) has also adopted *green principles* in the directives to companies and issued green bond guidelines to spur green financial product principles.
- The Pakistan Institute of Corporate Governance, as part of its director's training programme disseminates information on *adoption of ESG principles* in terms of reporting, board diversity etc.

3.2.3. Climate Risk Management

Strategic Alignment

Mitigating climate change risks is a critical concern for China, as evidenced by the country's Nationally Determined Contributions (NDCs) to the Paris Agreement and its national climate policies. Additionally, China has committed to achieving carbon neutrality before 2060 (ibid). In the financial sector, the People's Bank of China (PBoC) and China Banking and Insurance Regulatory Commission (CBIRC) have released regulatory guidelines aimed at addressing climate change risks, such as the Green Credit Guidelines from 2012, the Guidelines for Establishing the Green Financial System from 2016, and the Guidance on Promoting Investment and Financing to Address Climate Change from 2020. These guidelines also include provisions focused on managing climate risks.

Regulatory and Banking Association Actions

Banks in China are required to manage environmental risks, including climate change, as part of their governance, policies, and procedures, according to the Green Credit Guidelines (2012). The Guidelines also establish reporting and supervision requirements by the CBIRC. The Guidance on Establishing the Green Financial System (2016) calls for regulators to incorporate environmental risks into stress tests for credit risks and for institutional investors to analyze the environmental risks and carbon intensity of their investments.

China's Guidance on Promoting Investment and Financing to Address Climate Change (2020) emphasizes climate mitigation and adaptation efforts to achieve China's NDC and to prevent climate investment and financing risks. CBIRC and CBA launched a joint initiative on carbon neutrality in 2021, covering 80 per cent of the Chinese banking sector and aiming to integrate a climate risk management framework into existing regulatory systems (Industrial and Commercial Bank of China, 2021). PBoC is a founding member of the Network for Greening the Financial System, and several Chinese financial institutions support the Task Force for Climate-related Financial Disclosures (TCFD).

Expectations for Financing Institution Actions

To manage environmental and social risks, CBIRC requires banks in China to evaluate and manage portfolio-level risk exposure in high-risk sectors and to use environmental and climate risks as drivers in credit risk stress tests. Two banks, ICBC and CCB, have conducted stress tests on the credit quality of loans in the thermal power and chemical sectors in response to transition risk, as shown in carbon price factors and environmental protection policies. The CBIRC-CBA carbon neutrality initiative launched in 2021 will serve as a foundation for developing climate risk metrics, stress testing methodologies, and carbon disclosure approaches that reflect international standards like TCFD. In 2020, as part of the Green Financing Statistical System Notice, 21 major domestic banks submitted data on green credit risk and environmental benefits, including greenhouse gas emissions, to regulatory authorities every six months.

3.2.4. Financing Sustainability

China has established a comprehensive framework to finance sustainability across various sectors. The banking sector adheres to the Green Credit Policy by

CBIRC, while the capital markets follow the Green Bond Guidelines by PBoC. Asset management is guided by the Green Investment Guidelines by AMAC, which are aligned with international standards such as the Green and Social Bond Principles and Sustainability Bond Guidelines by the International Capital Market Association, as well as the EU Green Bond Standard. The country's approach is also driven by its commitment to the Paris Agreement's NDCs and five-year development plans. In 2021, CBIRC and CBA jointly launched the Chinese Banks Carbon Peak & Net Zero Initiative, a carbon neutrality initiative for banks that has received regulatory support and is the first of its kind in the market. Moreover, PBoC, CDB, and other policy banks have a data sharing system to facilitate and monitor sustainable finance flows.

Regulatory and Banking Association Actions

China has recently revised its national Green Bond Catalogue, previously known as the PBoC Green Bond Endorsed Catalogue. PBoC regularly updates the catalogue, and the latest version has eliminated clean coal while incorporating the "Do No Significant Harm" (DNSH) principle of the EU Taxonomy. This principle ensures that activities aimed at specific environmental goals do not harm other environmental objectives. In 2018, PBoC issued the Notification of Green Credit Performance Evaluation of Deposit-taking Financial Institutions, which outlines evaluation criteria and methodologies for assessing banks' green credit performance. The results of this evaluation are included in the banks' performance evaluations. Additionally, CBIRC has been conducting biennial data consolidation and aggregated disclosure on green credit statistics based on submissions from financial institutions since its Notice on the Submission of Green Credit Statistics in 2013. The availability of consistent and continuous data has demonstrated the link between green lending and lower credit risk, among other things.

Expectations for Financing Institution Actions

The China Green Credit Guidelines mandate financial institutions to create a plan, governance structure, and procedures for integrating ESG factors and promoting green credit expansion, as well as providing ongoing training to employees to enhance their knowledge of green banking. PBoC and CBIRC require banks and financial institutions to report on their green loans and investments quarterly and biennially, using comprehensive reporting templates that include both qualitative and quantitative data. PBoC intends to include banks' green banking performance in Macro Prudential Assessment (MPA). According to PBoC's Green Bond Guidelines,

FI issuers must arrange for external reviews of their bonds' green credentials. In June 2021, PBoC issued the Banking Sector Financial Institution Green Finance Assessment Plan, which includes green bonds in the annual evaluation of major financial institutions, in addition to green loans. PBoC will assess financial institutions based on their green bond holdings and how well they implement national and local green financing policies.

Policy Implications and Lessons Learnt

CBIRC is in the process of revising its green credit guidelines to encompass both the banking and insurance sectors. To build on the existing green loan categorization, which was introduced in 2013 and updated in 2019, CBIRC intends to create a statistical classification system for green insurance activities. This will address the lack of a clear definition of green insurance in China. With the goal of achieving peak carbon emissions by 2030 and carbon neutrality by 2060, China has launched an industry initiative, supported by CBIRC, to enhance banks' understanding and capacity to contribute to these targets. The initiative will concentrate on climate disclosure, stress testing, climate finance product innovation, and asset allocation.

Building upon the lessons described in this chapter from China:

- The opportunity facing Pakistan to derive, internalize and implement greening mechanisms to large-scale projects is one that presents itself rarely in a country's socio-economic history. While China's banking and finance sector is not comparable to Pakistan's in terms of size or stage of evolution, the journey towards achieving and embedding ESG and greening themes is not different. Pakistan can learn from the challenges and successes of the on-ground experience in China, especially through the banks already engaged in financing CPEC projects.
- There is a need to create institutional linkages to ensure a sustained transfer of this knowledge. This effort can be led by the SBP as the Green Banking Guidelines have not been made mandatory yet. Pakistan's commercial banks can be taken on-board through avenues such as the Banking Association of Pakistan and NIBAF (National Institute of Banking and Finance). Further, there is a gamut of think-tanks focusing on CPEC in Pakistan (discussed later) and these can provide a useful conduit to impart and disseminate this knowledge collateral.

4. CHAPTER 4: GREEN FINANCING FRONTIERS: THE WAY FORWARD FOR CPEC

In Pakistan, the focus on climate change has historically been overshadowed by more urgent economic and security crises. Nevertheless, in the light of the unprecedented devastation of the 2022 floods that left the country reeling under the human, social and climatic crises, there is a growing realization that Pakistan needs to realign its climate change priorities and adaptive development goals. Though Pakistan rightly laments that the global impact of emissions is being disproportionately borne by Pakistan, whose contribution is about one per cent, there is also an awakening that it must mitigate climate effects, especially in the wake of the large CPEC infrastructure projects being erected in the recent past which otherwise risk contributing to GHG emissions significantly. In case, these do not follow green principles, the massive highways, the energy projects, and the enhanced trade routes will be because of big “fossil fuel guzzlers”. International opinion must also be mobilized to take account of “climate justice” or the concept of ecological retribution whereby the rich industrialized nations support vulnerable countries in meeting climate change aspirations, thus paying towards the cost of their own pollution footprint.

4.1. Market Gap for Investment in Clean Energy Projects

Two of the biggest international agencies involved in the process are the Global Environment Facility (GEF) and Green Climate Fund (GCF). Till date, GEF has supported 38 projects in Pakistan by providing nearly \$100 mm in funds (Aslam, H.; Rizwan, N.; 2022); GCF is currently facilitating four projects by providing a total of \$131 mm. However, even collectively, these investments are insufficient to curb the climate crisis in Pakistan. As per the NDC targets set in 2021, the country requires at least \$101 bn for energy transition by 2030, while the cost of adaptation has been estimated around \$7-14 bn per year till 2050 (ibid). These exclude the US\$16.2 bn cost of the 2022 floods, which is an urgent need to cover the humanitarian and social cost. In the long-term, the estimated opportunity for green growth is approximately \$197.1 bn (based on IFC's internal analysis).

A significant opportunity for Pakistan in this regard is the building sector. Pakistan has been slow to take action on the housing and construction area where the backlog is estimated at least 10 million houses. The greening opportunity is significant in terms of sustainable design, materials, and energy sources (VRE). Following this segment are electric vehicles and renewable energy. These can

potentially make a significant mark in emission reduction, helping Pakistan meet its national commitments. Following in their heels is Agriculture, Water Resources and Solid Waste management. Agriculture is a clear opportunity given that Pakistan’s water resources are dwindling, and the country cannot afford to continue its sub-optimal water usage. Though small pockets of experiments have been done in smart agriculture, there is a need to scale these up. The potential interventions are estimated to lead to up to 20% of GHG emission reduction by 2030. Most of these themes run across the CPEC projects and there is a need to seize the opportunity to focus on the greening efforts towards those projects. The investment potential for various sub sectors are described in **Figure 12**.

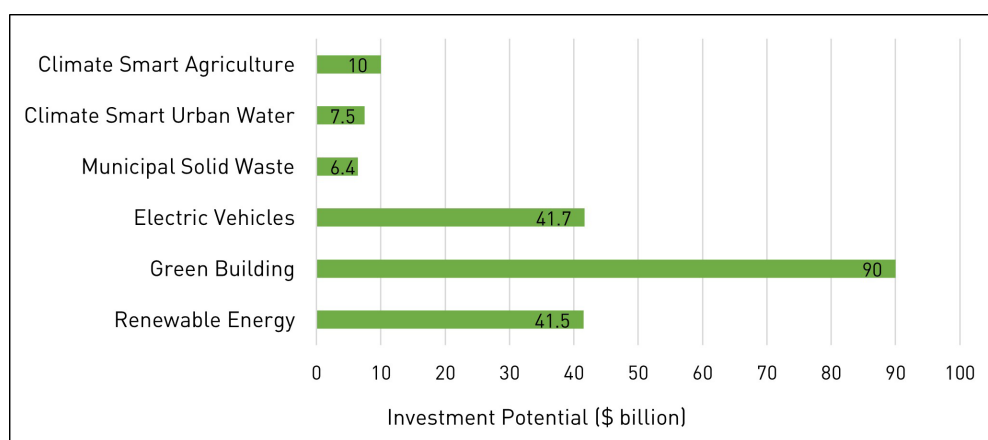


Figure 12: Potential of green investment across various subsectors in Pakistan (Aslam, H, Rizwan, N 2022)

Policy Implications

Transition towards clean energy

- Use climate finance mechanisms such as Chinese Energy Transition Mechanisms to support early retirement of existing fossil fuel plants under CPEC.
- Initiate competitive bidding for RE, starting with 2 GW by the middle of 2023 followed by annual rounds of procurement to meet the IGCEP (Indicative Generation Capacity Expansion Plan) targets.
- Engage Chinese private sector investors to accelerate plans for additional solar and wind capacity at identified sites, and through parallel development of strategically located RE parks.
- Both China and Pakistan can agree on an exclusion list containing non-fundable processes due to their adverse environmental or ecological impacts without an economically feasible mitigation plan.

- For providing a supportive environment to clean energy projects from Chinese investments, financing institutions can consider differentiated and risk-adjusted financing conditions for these projects. Green financing instruments such as green bonds, commercial guarantees, insurances, and facilities may also be used to provide the necessary support.
- To upscale Chinese private sector financing, there is a need to develop a long-term policy for and RE based adaptation and mitigation plans.

Tightening the Environmental Regulations

- For greening of the investments coming under the CPEC, environmental considerations must be applied across the whole project lifecycles. This includes multiple phases ranging from project screening and evaluation to decommissioning of the project.
- Financing institutions, project developers, and regulatory bodies must provide a comparatively more supporting environment for green investments under CPEC by striving to prefer environment-friendly projects over others. These investments can be referred to in the Traffic Light System of the BRIGC green development guidance.
- Financing institutions involved in the project must ensure that an independent Environmental Impact Assessment (EIA) is obtained by the project developers. Based on the equator's principle, a low-risk project requires at least a local EIA while for medium-high risk projects, an international EIA in compliance with international standards (World Bank or IFC) should be obtained and must include disclosure and public participation.
- For medium and high-risk projects under CPEC, the financing institutions should demand an Environmental Social Management System (ESMS), under which their clients must report the progress on environmental mitigation measures after every six months.
- A "grievance redress mechanism" in local language must be accessible to the people, who are negatively impacted by the project under its various phases. Affected people or community-based organizations must be able to directly express their concern to the financing institution through this mechanism.
- In investment agreements, financial institutions incorporate covenants that enable them to collaborate with clients to correct any violation of environmental and social agreements. They can also enforce remedies, including calling events of default if necessary.
- SECP ought to mandate Environmental Information Disclosures (EIDs) for financial reporting of all CPEC companies. This will guarantee that information

regarding the probable impact of projects is accessible to the public and enable them to evaluate all the risks linked with the project more effectively.

Green Financing Mechanisms

- To reduce risk around green financing, Pakistan Stock Exchange should play its role by actively engaging in promoting sustainable stock exchange, green shares, and green trade.
- SBP should incentivize commercial banks to introduce more innovation in green financial products so that investors have more choice, thereby increasing the use of funds for green projects.
- To build the capacity of stakeholders regarding the contours of green financing guidelines and tools, crash or literacy programs should be conducted on the green financing market.
- To provide a congenial environment for RE investments, there is a need to develop "Renewable Energy Certification" policy such as upcoming GCC certifications.
- To ensure uptake of RE on behalf of Chinese private sector, there is a need to open communication channels that ensures consensus and uniformity, on-time payments, provisions of liquidity damages, and ensures the sanctity of contracts.
- Capacity building on environmental (and social) risk evaluation, risk management and relevant international reporting should be strengthened through international collaboration and digital and offline knowledge sharing for financial institutions, policy makers and developers, as well as affected communities.

Demand Side Efficiency

- Develop the market for ESCOs (Energy Service Companies) to mobilize private-sector investment. The model allows companies to carry out energy services without the clients having to invest their own capital into the projects.
- Institute commercially driven replacement or exchange programs for inefficient lightbulbs, streetlights, and fans. The technology drive may be driven by the knowledge exchange programs with China.
- Develop acceptable minimum performance standards for mass-market appliances. Improve the energy efficiency of existing and new buildings in the commercial and industrial sectors by encouraging certification (e.g., green building EDGE certification by IFC).
- Promote Climate Smart Municipal Services and Urbanization

- Strengthen regulations for SWM (Solid Waste Management) and transition to low-carbon solutions. Consider out of box solutions such as waste cooking oil being transformed into bio diesel such as in China.
- Expand water treatment capacity and transition to more efficient existing water supply infrastructure.
- Create sustainable revenue streams for green and resilient urbanization through various approaches, including Public Private Partnerships.
- Develop a performance-based, climate-resilience-focused, grant-financing mechanism.

4.2. The Development Angle to Climate Change: Role of Multi-lateral and other Development Agencies in the Sustainability Space

4.2.1. Linkages with CPEC

There are multiple development organizations actively promoting sustainability and climate-change redressal in Pakistan along with national level efforts at the Ministry of Climate Change and its child agencies. While not all sustainability projects in the development space elucidated below are directly related to CPEC projects, there are clear linkages in terms of leveraging some of these projects for learning, using some of the assessment tools and other types of collaboration. As an example, some of the IFC tools are extremely relevant to use in assessment methodology, especially as some of the CPEC projects are following China-centric sustainability standards and it is the same institution, i.e. IFC which has worked closely with the Government of China to develop international standard industry codes and practices related to sustainable practices both in financing of projects as well as infrastructure implementation, execution and operationalization.

There are multiple lessons of experience from implementing green standards to infrastructure projects. There is also an opportunity to partner with some of the other development agencies that are working to disseminate learnings and engage local communities. Hence, any holistic approach to greening of large infrastructure projects must not be seen in a silo but should tap into available potential synergies with the multifarious projects already operating in this space. The partnership models can be both through investment and advisory approaches to unlock optimal impact through innovative frameworks.

4.2.2. Development Partners and Financing Institutions

International Finance Corporation (IFC)

Given its role as the private sector arm of the World Bank, the IFC has done pioneering work in Environment and Sustainability in a holistic way, investing in projects on one hand and providing advice and hand holding companies through the adoption of ESG-centric policies. IFC has also developed some assessment and implementation tools to help businesses address sustainability and these are widely accepted as the gold standard across many industries. Among these, the following are of key importance:

- **IFC Greenhouse Gas (GHG) Accounting Tools:** The GHG Accounting portal by IFC offers a range of resources to educate both staff and clients on the methodologies used for calculating GHG emissions from their climate-related projects. This includes guidance notes and climate definitions, as well as a variety of specialized tools designed for specific sectors. These tools include the IFC Carbon Emissions Estimator Tool (CEET) which is useful for estimating the GHG emissions of a project, and the IFC Forest Industry Carbon Assessment Tool (FICAT) which is specifically tailored to calculating the carbon footprint of forest-based manufacturing activities³.
- **IFC CAFI:** CAFI (Climate Assessment for FI Investments) enables financial intermediaries to determine the eligibility of their climate-related transactions, empowering them to report on their findings. By streamlining the compliance process, CAFI facilitates the ability of local banks to swiftly respond to market demands, such as rising energy costs, while also testing the financial feasibility of their projects. As banks expand their portfolios of small and medium-sized enterprises (SMEs), they establish a robust market for climate business that enables local companies to enhance their productivity, decrease operational costs, minimize greenhouse gas (GHG) emissions, and generate novel employment opportunities⁴.
- **IFC EDGE:** EDGE (Excellence in Design for Greater Efficiency) is an application designed for green buildings that empowers users to identify the optimal technical solutions for minimizing environmental impacts, while also considering the upfront costs and anticipated operational savings. This powerful tool ensures that a building attains a 20 percent improvement in efficiency related to energy, water, and material usage, thus defining a universally

3 www.ifc.org/ghgaccounting Department

4 www.ifc.org/cafi Department: CFGCC/CAISM/CBG (2013).

recognized green standard that is highly necessary. Although EDGE is financially motivated, its outcomes are primarily environmental in nature, as it encourages sustainable development that can help mitigate climate change.

- **ESRM Implementation Manual:** Recently, the IFC and the State Bank of Pakistan jointly launched the ESRM (Environmental and Social Risk Management) Implementation Manual for banks and DFIs, which is a procedural guide for the banks/DFIs to establish their environmental & social risk management systems, as advised in SBP's Green Banking Guidelines (GBGs).

The World Bank and Asian Development Bank

Recently, the WB and ADB jointly launched a Climate Risk Country Profile for Pakistan, which outlines rapid onset and long-term changes in key climate parameters, as well as the impact of these changes on communities, livelihoods, and economies—many of which are already underway. The aim of the series is to provide development practitioners with easy-to-use technical resources to facilitate upstream country diagnostics, policy dialogue, and strategic planning.

The WB also has a climate change data portal which contains key information on climate change and multiple knowledge resources.

The Country Climate and Development Report (CCDR) was launched by the World Bank in November 2022, which is a new diagnostic tool that examines how a country's developmental objectives can be achieved while also adapting to and mitigating the effects of climate change. The Pakistan CCDR report offers suggestions and policy recommendations on how to integrate the country's efforts to reduce poverty and boost economic growth with the pursuit of a sustainable, low-carbon, and climate-resilient development path, particularly after the devastating heatwaves and floods in 2022, which exposed the country's vulnerability. The report places a strong emphasis on the need to build long-term resilience and analyzes possible pathways for Pakistan to attain deep decarbonization by 2050 and eventually achieve net-zero emissions by 2070, all while not hindering its development goals.

Additionally, the CCDR evaluates the technical, financial, institutional, and governance frameworks required for these climate transitions. The report also emphasizes the significance of people in climate policies, assessing how climate risks affect their lives and livelihoods and outlining ways for governments to build

resilience and address the poverty, distributional, and job impacts of climate change and climate actions. Lastly, the CCDR highlights ways for Pakistan to foster collaboration between the public and private sectors and garner support from the international community.

United Nations Development Programme (UNDP)

The UNDP, like other developmental organizations, is committed to tackling climate change and promoting sustainability. Their projects are aligned with national climate change policy, national DRR policy, sustainable development agenda, the Sendai Framework for DRR, and UNSDF for Pakistan 2018-2022. Their objective is to provide support to the Government of Pakistan and its partners in enhancing environmental sustainability and building resilience to climate change and natural disasters at the national, provincial, and local levels. At the federal level, the UNDP collaborates with the NDMA (National Disaster Management Authority), while at the provincial level, they engage with Sindh and Baluchistan's PDMAs (Provincial Disaster Management Authority).

At the local level, they involve district authorities and relevant departments such as the Pakistan Meteorological Department (PMD) for national and sub-national activities, including Tsunami monitoring. Moreover, the UNDP plans to engage NED University, Karachi, to undertake an in-depth assessment of earthquake and tsunami risk. The project interventions focus on population groups in Gilgit-Baltistan Region, South Punjab, Sindh, and Baluchistan, with an emphasis on engaging communities that are marginalized or most vulnerable to the impacts of climate change, with a particular emphasis on women's participation.

UKAID

UKAID is also a key player in the sustainability space in Pakistan both through knowledge sharing as well as strategic financing. Its main functions are carried out through its Special Purpose Vehicle (SPV), Karandaaz; and a Sustainable Energy and Economic Development (SEED) programme. Karandaaz's Green Initiative comprises multiple investments in renewable energy, alongside a challenge fund. Among these investments is a commercial green building in Karachi that meets reputable accreditation standards and has the potential to become Pakistan's first Green Real Estate Investment Trust (REIT). To date, Karandaaz has backed 10.6 MW of clean energy capacity in the textile, SME, and household segments through its investments in renewable energy.

SEED is a six-year, £37.5 mm programme, funded by the United Kingdom Foreign, Commonwealth and Development Office (FCDO). Adams Smith International (ASI) is implementing the first component (£15 mm) of the programme. SEED pursues sustainable change-this means reforms which are rooted in existing institutions, public investments that are more inclusive, and increasing resilience to climate change. A major component is aimed at improving economic and urban planning in Khyber Pakhtunkhwa (KP) to help the province plan and finance investments it needs for growth, jobs and prosperity. SEED commenced its inception in March 2020, with the objective of engaging counterparts within Government of Khyber Pakhtunkhwa (GoKP) and undertake detailed scoping studies and assessments to inform the design of SEED's implementation phase.

GIZ (DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) GMBH

GIZ has been working in Pakistan since 1963 and Green Recovery and Sustainability are core values at the heart of GIZ's work. Among its various projects is "Improving climate adaptation and resilience in Pakistan" with a view to strengthening climate adaptation and resilience, Commissioned by the Federal German Ministry for Economic Cooperation and Development (BMZ). The lead executing agency would be the Ministry of Climate Change with the project lasting from 2021 to 2025. The project aims to improve the conditions for climate adaptation and climate risk management by promoting financial instruments to mainstream them into the budgeting and planning processes for better protection and risk covering measures for the most vulnerable groups, especially women.

GIZ is also active in the infrastructure and energy space through the "Renewable Energy and Energy Efficiency in Pakistan (REEE II)" project, commissioned by BMZ, with the executing agency being the Economic Affairs Division, government of Pakistan. The main objective is to support the supply of renewable energy, improve its financing and energy efficiency and contribute to sustainable economic growth in Pakistan and to global climate protection.

AGENCE FRANCAISE DE DEVELOPPMENT (AFD)

AFD, the French development agency, has been working in Pakistan since 2006 to provide financial and technical support to the government's development policies. AFD collaborates with government partners and local authorities to develop low-carbon infrastructure and enhance access to essential services for the public. The

agency is committed to promoting the energy transition in Pakistan and bridging the supply and demand gap by promoting low-carbon energy alternatives. With significant untapped hydroelectric potential, estimated at around 54 GW, of which only 12% has been utilized, AFD is focusing on financing energy efficiency and improving the performance of existing hydroelectric plants to ensure reliable and affordable energy supply.

As a key player in Pakistan's energy transition, AFD's strategy involves promoting decarbonized energy, strengthening the distribution network, and engaging in policy dialogues on the sector. For example, AFD is currently financing the rehabilitation and construction of hydroelectric power stations, which not only benefits the economy by promoting affordable power production but also supports local communities by providing flood prevention and warning systems.

Policy Implications

- Many of these institutions hinge on climate change as a primary pillar. Each of these institutions has implemented its own mechanism for measurement, which plays an important part in their country interventions. There is a need to develop a collaborative/harmonized framework of measurements for concerted efforts towards the climate action needs.
- Establish metrics of measurement and reporting systems to systematically monitor and report on the costs and benefits of climate actions.
- Introduce climate-risk screening and climate-informed public financial management at the federal and provincial levels.

4.3. Replicable Governance and Sustainability Recommendations for CPEC Projects based on Use-Cases

In the context of sustainability for large infrastructure projects, it is pertinent to review the learnings from an on-ground project which has imbibed these principles along its journey. Below is a deep dive into a hydropower project of the IFC, which is the World Bank's private sector arm providing a multi-faceted approach to infrastructure projects. Along with the financing, IFC advises the project on multiple operational issues, not the least of which is environment, sustainability, and governance or ESG. While the project below is not part of CPEC and pre-dates it, there are significant learnings and forward-looking policy implications at every stage from portfolio oversight during the set-up stage as well as impact assessments and knowledge collateral based on candid success metrics as well as failures along the

way which can be avoided in future projects. It is extremely pertinent to incorporate and internalize these learnings as CPEC also includes a few hydropower projects. Some of the lessons pertain to large projects and stakeholder engagement so they are relevant for other CPEC energy projects.

4.3.1. Sustainability Strategy for JRPB Hydropower Project

IFC takes a comprehensive approach to managing the environmental and social risks of power projects in Pakistan, which is distinct from the traditional method of addressing them individually. The organization's Environmental, Social, and Governance Advisory Program provides guidance to companies on managing environmental and social risks, facilitating private sector investment in the hydropower sector while promoting sustainable development.

Through the JRPB project, IFC has collaborated with government officials, investors, developers, and stakeholders from environmental organizations and academia to create a strategy for sustainable hydropower development. The strategy is the first basin-wide development roadmap incorporating guidelines that all hydropower plants operating in the region should follow, including a coordinated plan for water flow and sediment flushing along the rivers. This innovative approach benefits both the government and hydropower companies, allowing them to harness Pakistan's natural resources for energy production while preserving its environment and biodiversity.

Key Learnings

In order to achieve a balance between conservation and development and minimize negative environmental and social impacts in the basin, it is essential to engage multiple stakeholders and provide them with practical guidance. This engagement process should involve government, developers, and other stakeholders, and the strategy should offer recommendations for hydropower developers and government to adopt best practices in all of their projects.

Recommendations for Government

- The provincial environmental protection agencies (EPAs) are recommended to establish guidelines for selecting and maintaining appropriate Environmental Flows (EFlows) that align with the Good Practice Handbook on Environmental Flows for Hydropower Projects by the World Bank Group. Furthermore, the EPAs

should also create guidelines and standard operating procedures to address emergency shutdown procedures during project operations, which must be included in the Environmental and Social Impact Assessment (ESIA).

- To ensure compliance with Environmental and Social Impact Assessments (ESIAs) or environmental social management plans (ESMPs), the state and provincial environmental protection regulations in AJK, Punjab, and KP should be revised. This revision should include direct linkages between the approved environment and social cost allocation by the National Electric Power Regulatory Authority (NEPRA) and the budgets allocated and utilized by project sponsors. Furthermore, hydropower projects that have a capacity of less than 50 megawatts (MW) and are situated in ecologically or socio-economically sensitive areas identified in this strategy should require an Environmental Impact Assessment (EIA).
- To encourage sustainable sediment mining from riverbeds and banks, policies, laws, and regulations should be revised. The revisions should be based on the fundamental principles of safeguarding sensitive river habitats by limiting the extent and type of mining to the less sensitive areas. This will serve to meet the basic needs of the community while also protecting the livelihoods of the poor and vulnerable mining communities.
- To safeguard the ecological resources of the Poonch River Mahseer National Park, a high level of protection must be maintained. Additionally, the Mahl River should be designated as a protected area. Other critical tributaries that exhibit a high degree of ecological sensitivity must be identified, and hydropower development should be minimized or avoided in these areas.
- To enhance the implementation of effective environmental management and protection, it is necessary to allocate additional budget and human resources and thereby increase the capacity and capability of government departments.
- To monitor the status of fish populations in the river and its tributaries, surveys should be carried out for various fish species. Sustainable fishing programs may be initiated in chosen areas based on estimates of fish populations.
- To meet the community's needs for sand and gravel, government departments should assist hydropower developers in creating a sediment-management strategy that encompasses the entire basin.
- To reduce the negative impacts of transmission line construction and operation, guidelines for planning and construction should be developed, particularly in areas that are sensitive or protected. These guidelines should be developed by the provincial environmental protection agencies (EPAs).
- To ensure that comprehensive environmental and social impact assessments (ESIAs) are carried out for relevant hydropower projects, the terms of reference

should incorporate the cumulative assessment requirements and comply with the IFC Performance Standards and the Asian Development Banks Safeguard Policy Statement.

- To better safeguard aquatic ecological resources from anthropogenic impacts like illegal fishing, pollution, and sediment extraction, the government departments concerned must increase their coordination.
- To govern reservoir management, guidelines must be developed. While selective commercial and recreational fish harvesting may be permitted, stocking exotic fish species should be avoided.
- Training programmes should be conducted for both managers and local fishers to manage invasive fish species, while reservoirs should be managed in a manner that safeguards migratory birds and, if suitable, developed for recreational purposes.
- Consistency is crucial for environmental regulators, especially the EPAs, when assessing the environmental impact and performance of hydropower projects, regardless of ownership. It is essential to encourage developers to adopt international best practices for environmental management, mitigation, and monitoring.
- To address concerns in the environmental design of HPPs, it is crucial to establish a methodology to calculate the cost of mitigating negative environmental impacts. This cost should then be included in the electricity tariff. Additionally, NEPRA staff's capacity should be improved to manage emerging environmental issues in HPPs.
- The government planning departments need to update the SEA (Strategic Environmental Assessment) prepared by IUCN in 2014. This update should include the Kunhar Basin and integrate the most recent information available.

Recommendations for Hydropower Developers

- During the feasibility stage, it is essential to evaluate environmental and social risks to strike a balance between power-generation advantages and adverse environmental and social impacts in the design of HPPs.
- Accepted international best practices require both publicly and privately-owned HPPs to establish and execute a biodiversity management plan or a biodiversity action plan.
- Develop a stakeholder engagement plan and a grievance redress mechanism in line with accepted international good practices.
- It is necessary to establish a database for the Jhelum-Poonch Basin to facilitate storage and retrieval of information on hydrology, ecology, geomorphology,

water quality, climate, socioeconomics, and hydropower projects.

- Contribute toward the establishment of a watershed management programme to reduce erosion in the catchments and flow of pollutants into the river.
- Even if the schedules for project initiation are not synchronized, proponents must consult with each other on project design to enable synergistic development when HPPs are located near each other on a main river or tributary nullahs. Such consultation should be compulsory.
- Contribute towards the establishment of a river ecology institute to conduct research on river biodiversity, impacts of HPPs, and mitigation options.
- To improve their environmental management and protection capabilities, staff and consultants of HPPs should stay up-to-date with the latest research and studies while also participating in training and capacity-building initiatives.
- A basin-wide sediment management strategy should be developed for all committed HPPs in the Jhelum-Poonch Basin.
- Collaborate on issues of mutual concern through the Hydropower Developers Working Group (HDWG) and share lessons learned and good industry practices.
- To mitigate the impacts during the construction phase, it is essential to transport fish from downstream to upstream of the dam, create an impoundment or commissioning plan, and prohibit sediment extraction and disposal into the river.
- Developers should devise a standard operating procedure to address cases of accidental or emergency stoppage of water flow during operation.
- Devise and execute a monitoring and evaluation plan along with adaptive measures to address substantial negative impacts on ecology and ecosystem services resulting from HPPs.

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Annexure A1: List of CPEC Energy Projects

Completed Projects		
1	1320MW Sahiwal Coal-fired Power Plant	Project Completed on 28th October 2017
2	1320MW Coal-fired Power Plant at Port Qasim Karachi	Project completed on 25th April 2018
3	1320MW China Hub Coal Power Project, Hub Balochistan	Project completed on 17th Aug 2019
4	660MW Engro Thar Coal Power Project	Project completed on 10th July 2019
5	1000MW Quaid-e-Azam Solar Park (Bahawalpur)	400 MW project completed in August 2016, 600MW under Implementation
6	50 MW Hydro China Dawood Wind Farm, Gharo, Thatta	Project completed on 5th April 2017
7	100MW UEP Wind Farm, Jhampir, Thatta	Project completed on 16th June 2017
8	50MW Sachal Wind Farm, Jhampir, Thatta	Project completed on 11 April 2017
9	100MW Three Gorges Second and Third Wind Power Project	Second Wind Farm completed on 30th June 2018. Third Wind Farm completed on 9th July 2018.
10	Matiari to Lahore ±660 KV HVDC Transmission Line Project	Project completed on 1st September 2021.
11	330MW HUBCO Thar Coal Power Project (Thar Energy)	Financial Close (FC) achieved on 30th Jan 2020. Project Completed on 30th September 2022.
12	720MW Karot Hydropower Project, AJK/Punjab	Financial Close (FC) achieved in March 2017. Project Completed on 29th June 2021.
Projects in Progress		
13	1320 SSRL Thar Coal Block-I 7.8 mtpa & Power Plant (2x660MW)	Mine Financial Close (FC) achieved on 30th Dec 2019. Power Plant Financial Close (FC) under process. 66% work Completed. GoS-WUA signed on 25th February 2021.
14	330MW HUBCO ThalNova Thar Coal Power Project	Financial Close (FC) achieved on 30th September 2020. 51% work completed.
15	884MW Suki Kinari Hydropower Project, KP	Financial Close (FC) achieved in Feb 2017. 70% work completed.
16	300MW Coal-Fired Power Project at Gwadar	Tariff determined in Sep 2019. Land acquired in Feb 2020. GoP-IA and PPA signed on 8th April 2021. Financial Close (FC) under process.
Projects under Pipeline		
17	1124MW Kohala Hydropower Project, AJK	Land Acquisition process started. TPA, TPPA and GoP-IA signed on 25th June 2020. GoAJK-IA and GoAJK-WUA signed in April 2021. Financial Close (FC) under progress.
18	700.7MW Azad Pattan Hydropower Project, AJK/Punjab	Land Acquisition process started. TPPA, GoP-IA, and GoPb-WUA Signed in July 2020. GoAJK-IA and GoAJK-WUA signed in December 2020. Financial Close (FC) under progress.

Annexure A2: List of CPEC Transport Pro

Completed Projects	
1	KKH Phase II (Havelian - Thakot Section)
	Work commenced in September 2016. Havelian - Mansehra Section Inaugurated by Prime Minister on 18th November 2019. Mansehra - Thakot Section Inaugurated by CM KPK on 28th July 2020.
2	Peshawar-Karachi Motorway (Multan-Sukkur Section)
	Construction work commenced in August 2016. Project Completed and inaugurated on 05 November 2019.
3	Orange Line Metro Train - Lahore
	Project completed and inaugurated on 25th October 2020.
4	Cross Border Optical Fiber Cable (Khunjrab - Rawalpindi)
	Ground-breaking did by the Prime Minister. Work commenced in October 2015. Project Completed and inaugurated by Prime Minister in July 2018.
5	Pilot Project of Digital Terrestrial Multimedia Broadcast (DTMB)
	Pilot Project inaugurated in April 2015.
6	Hakla - D.I Khan Motorway
	ECNEC approved separate PC-Is for construction and land acquisition on 07-11-2016. Project completed and inaugurated on 05 January 2022.
Projects under Construction	
7	Zhob - Quetta (Kuchlak) (N-50)
	ECNEC approved separate PC-Is for construction and land acquisition of the project on 28-03-2019. Prime Minister did the ground-breaking on 29th March 2019. Tendering for construction work of two sections is completed and contractor mobilized whereas the remaining three sections tendering will process soon.
8	Khuzdar-Basima Road (N-30)
	PC-I has been approved by ECNEC on 12-04-2017. Work started: October 2019. The project Basima-Khuzdar has been taken up through PSDP. 67% physical work completed. Expected completion date is December 2021.
9	Hoshab - Awaran Road Section (M-8)
	Tendering for construction work of is completed and contractor mobilized in June 2021.
10	KKH Alternate Route Shandur - Chitral Road
	Ground-breaking performed by Prime Minister in April 2021.
11	Nokundi-Mashkhel Road
	Prime Minister did ground-breaking on 20th May 2021. Tendering for construction work of is completed and contractor mobilized
Projects under Pipeline	
12	Up-gradation and Dualization of ML-1 and establishment of Dry Port near Havelian
	Feasibility completed. ML-1 Project declared 'Strategic' by 6th JCC in Beijing. Framework Agreement on ML-1 signed on 15th May 2017 during PM Visit to China. Commercial Contract for Preliminary Design signed on 15th May 2017. Project will be completed in 3 packages. PC-1 approved by ECNEC on 5th August 2020. Both countries constituted Financing Committee to finalize the concessional financing agreement.
13	Up-gradation of D.I.Khan (Yarik) - Zhob, N-50 Phase-I
	PC-I Approved by ECNEC on 12th April 2017. Land acquisition in Progress. The project is on the highest priority and under negotiation with the Chinese side. Financial negotiation is under process.
14	KKH Alternative Route Gilgit-Shandur Road
	PC-I approved with a cost of Rs 49.9 bn dated 4.6.2021. Procurement in process and will be finalized by Oct 2021.

15	Realignment of KKH Phase-I Thakot - Raikot Section	G-to-G technical working group has been constituted for the re-alignment of KKH Phase-I Thakot – Raikot Section
16	Peshawar - D.I.Khan Motorway	PC-I by ECNEC with a cost of Rs 276 bn. The project will be further discussed in next JWG meeting.
17	Awaran - Khuzdar Road Section (M-8)	PC-I approved with a cost of Rs 32 bn dated 26.5.2021. Technical bid evaluation is in process and procurement will be finalized by Nov 2021.
18	Dir Expressway	PC-I approved ECNEC with a cost of Rs 38.9 bn. The project will be further discussed in next JWG meeting.
19	DTMB-A (Digitalize the existing three sites of PTV)	The signing of revised LoE and IA is under process.
Long Term Projects		
20	Mirpur-Muzaffarabad-Mansehra Road	PC-I is under approval process.
21	Karachi Circular Railway	The project will be built in PPP mode. The Transaction Advisory is under process in P3A.
21	Mashkhel - Pangur Road	Detail design and feasibility are under process.
22	Quetta Mass Transit	Detail design and feasibility are under process.
23	Greater Peshawar Region Mass Transit	Detail design and feasibility are under process.

Annexure A3: List of CPEC Projects in Gwadar

CPEC Projects-Gwadar		
1	Development of Port and Free Zone	Tax exemptions for port and Free Zone notified in Finance Act 2020 1st phase (60 acres) completed 46 enterprises have been registered for investment in Free Zone. 03 companies started production First imports cum exports cargo by M/s HKSUN received in Gwadar free zone on 7th April 2021.
2	Gwadar Smart Port City Master Plan	Completed and approved by the governing body of GDA & ratified by the JCC in its 9th meeting held on 5th November 2019. Micro-Land use planning and Governance Model is under process with Gwadar Development Authority.
3	Pak-China Technical and Vocational Institute at Gwadar	Ground-breaking held on 16th December 2019. Project completed and inaugurated on 30th September 2021.
4	Gwadar Eastbay Expressway	Cost approved by ECNEC on 12-01-2015 Contract Agreement was signed b/w GPA & CCCC on 24-09-2017 The ground-breaking ceremony of Eastbay Expressway was held on 22nd November 2017 by Prime Minister Eastbay Expressway Gwadar: 19km (14.5 offshore completed & 4.5 onshore under construction.) Project completed and inaugurated on 3rd June 2022.
UNDER CONSTRUCTION PROJECTS		
5	New Gwadar International Airport	Ground-breaking held by Prime Minister on 29th March 2019. Construction work started on 31st October 2019. Expected completion date: March 2023.
6	Necessary facilities of freshwater treatment, water supply and distribution	Phase-1, laying of pipelines from Swad Dam to Gwadar is completed. Phase-II laying an additional pipeline from Shadi Khau Dam to Swad Dam is under construction. Phase-III, Up-gradation of the water distribution system of Gwadar city will be commenced this year.
7	Pak-China Friendship Hospital	Ground-breaking held on 16th Dec 2019. Civil work started by Nov 2020. Expected Completion date: December 2022
8	300MW Coal-Fired Power Project at Gwadar	Tariff determined in Sep 2019. Land acquired in Feb 2020. GoP-IA and PPA signed on 8th April 2021. Financial Close (FC) under process.
9	1.2 MGD Desalination Plant	Project Implementation Agreement signed on 5th July 2021. The civil work will be started this year and will be completed in 12 months.
10	5 MGD Water Desalination Plant Gwadar	The project PC-1 approved by ECNEC in 2018. Tendering under process.
IN PIPELINE PROJECTS		
11	Construction of Breakwaters	Joint feasibility study completed on June 2020. Draft PC-1 is submitted to MoPD&SI for approval of CDWP.
12	Dredging of berthing areas & channels	PC-1 for feasibility study has been approved from DDWP
13	Fish Landing Jetty and Fishermen Boat Making Industry on West Bay	Project agreed in 7th JCC. Pakistani side proposed grant funding. Feasibility study completed and shared with the Chinese side through EAD.
14	Gwadar Smart Environment Sanitation System and Landfill Project	Project agreed in 7th JCC. Pakistani side proposed grant funding. PC-1 approved by CDWP and Grant application submitted to EAD, which was forwarded to MOFCOM through the Chinese Embassy.

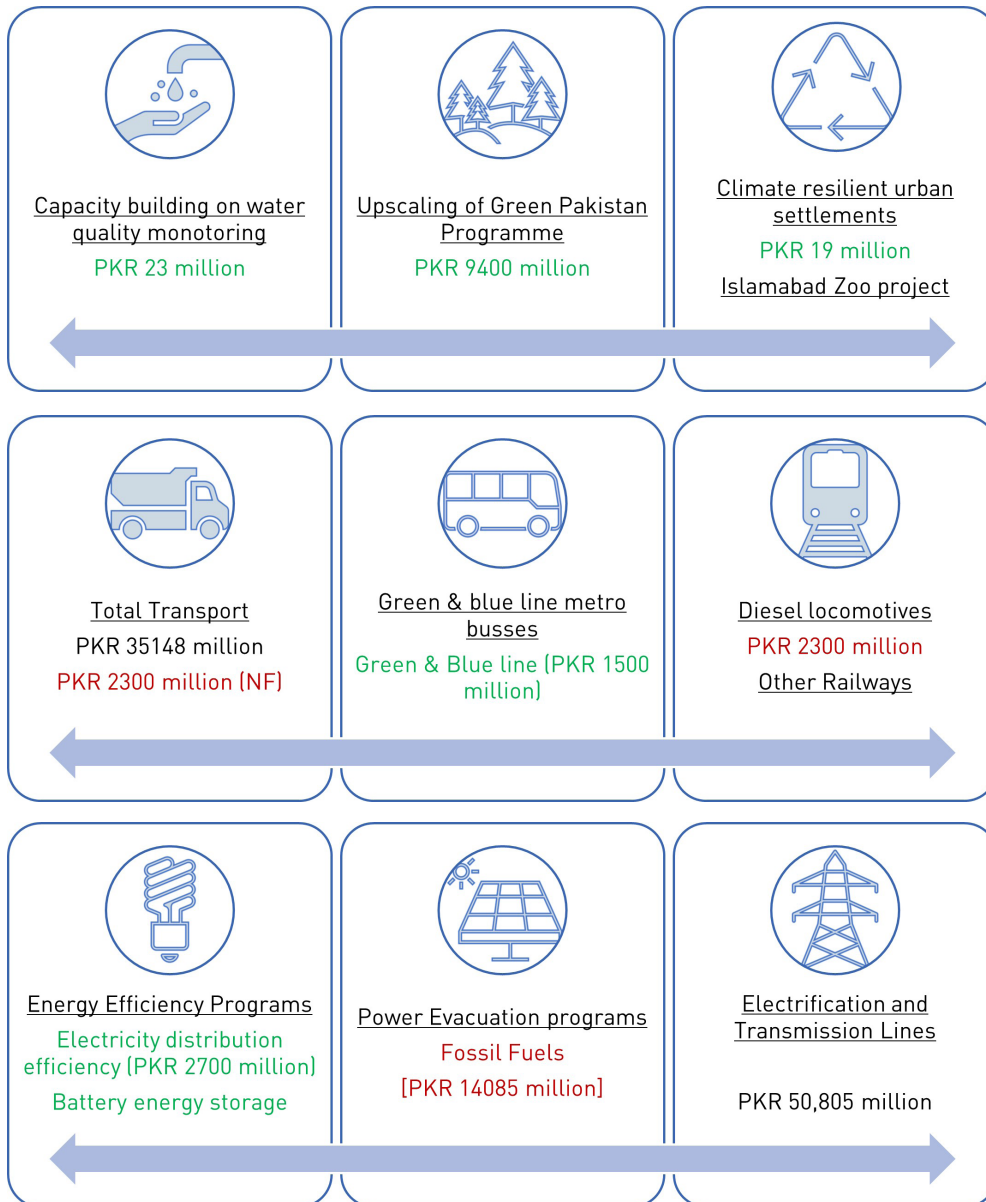
Annexure A4: List of CPEC Special Economic Zones

CPEC Projects-Special Economic Zones		
1	Rashakai Special Economic Zone	<p>Concession Agreement between Khyber Pakhtunkhwa Economic Zone Development and Management Company (KPEZDMC) and China Road & Bridge Corporation (CRBC) was signed in April 2019.</p> <p>The development agreement was signed on 14 Sep 2020 with a development cost of \$128 mm.</p> <p>Ground-breaking / launching of RSEZ was held on 28th May 2021.</p> <p>The land has been allocated.</p>
2	Dhabeji Special Economic Zone	<p>The bidding for the development of SEZ is in process. The preferred bidder will be announced soon.</p> <p>Utilities are being provided as per timelines.</p>
3	Allama Iqbal Industrial City	<p>Ground-breaking of AIIC was held on 3rd January 2020 which was attended by the Prime Minister of Pakistan. The land has been acquired for AIIC and development work is in progress since November 2019.</p> <p>Numerous national and international enterprises have been allotted plots in the SEZ. Few companies have already started construction work.</p>
4	Bostan Special Economic Zone	<p>The SEZ Approval Committee officially approved the Bostan SEZ on 4th March 2020 in the 5th Board of Approval meeting and awarded SEZ status on 5th May, 2020.</p> <p>Development work on phase-I (200 acres) has been completed.</p> <p>Phase-1 of Bostan SEZ has been launched for allotment of industrial plots.</p>
PIPELINE PROJECTS		
5	ICT Model Industrial Zone	
6	Industrial Park on Pakistan Steel Mill Land	
7	Mirpur Industrial Zone	
8	Mohmand Marble City	
9	Moqpondass Special Economic Zone	

Annexure A5: CPEC Projects: Social Sector Development

CPEC-Projects-Social Sector Development	
1	Vaccine storage and transportation equipment
2	Poverty Alleviation Training
3	Emergency relief supplies for enhancing NDMA, disaster preparedness capacity
4	Pakistan Vocational and Technical Education Capacity build-up project
5	Pakistan Vocational Schools equipment Upgrading and Renovation Project
Under Construction Projects	
6	China-Pakistan Joint Agricultural Technology Laboratory
7	Provision of Agricultural equipment and tools
8	Smart Classroom for Higher education
9	Maintenance and renovation for 50 schools in newly merged districts
10	Solar-powered lighting equipment
11	Overseas student scholarship
12	Medical equipment and materials
13	Gwadar hospital project
14	Brightness journey in Pakistan
15	Drinking water equipment
16	Gwadar Desalination Plant
17	Gwadar Vocational and Technical Project
In Pipeline Projects	
18	China-Pakistan Joint Agricultural demonstrations
19	Bacterial grass (JunCao) Technology Training and promotion project
20	Pakistan Agricultural Vocational Training
21	Provision of teaching equipment for primary and secondary schools
22	Burn Centres
23	China-Pak joint telemedicine network
24	Medical emergency centre in Baluchistan
25	Rural poverty reduction joint research project
26	Cooperative Project with Pak-Austria Fachhochule: Institute of Applied Sciences and Technology

Annexure 2: Climate favorable and non-favorable investments under PSDP of Pakistan



Annexure 3: List of Resources on the Chinese Environment and Climate National Framework

- Guidelines on Environmental Information Disclosures for Financial Institutions [PBoC, 2021]
- Banking Sector Financing Institution Green Finance Assessment Plan [PBoC, 2021].
- Updated Green Bonds Catalogue [PBoC, NDRC, and CRSC; 2021]
- Notice on Evaluating Green Credit Performance of Banking Deposit-type financial institutions external circular 028 of 2020 [PBoC, 2020].
- Guiding Options of the China Banking and Insurance Regulatory Commission on promoting high-quality development of the banking and Insurance Industry [CSRC, 2019].
- Policies and Actions for addressing Climate Change [MEE, 2019].
- Green Industry Guiding Catalogue [NDRC, 2019].
- Green Investment Guidelines [Asset Management Association of China, 2018].
- Compulsory Environment Pollution Liability Insurance Regulation [MoEP & CBIRC, 2018].
- The Green Investment Principles of the BRI [Green Finance Committee, 2018].
- Notice on evaluating green credit performance of banking deposit -type financing institutions [PBoC, 2018].
- Green Banking Assessment Plan [CBA, 2017].
- Guidelines for Green Bond Issuance for listed companies [CSRC, 2017].
- Institutional Investors Guidelines for Green Bond [NAFMII, 2017].
- Impact of Environmental Factors on Credit Risk of Commercial Banks [ICBC, 2016]
- Notice on Green Bond for Inter-bank Market and Green Bond Endorsed Project Catalogue [PBoC, 2016].
- Guidelines on the Issuance of Green Bonds [NDRC, 2016].
- Guidelines for establishing the green financial system [CBIRC, 2016].
- Notice on Green bond for inter-bank Market and Green Bond Endorsed Project Catalogue [PBoC, 2015].
- Green Credit Key Performance Indicators [CBIRC, 2014]
- Green Credit Statistics and Reporting Template [CBIRC, 2013].
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