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INTERNATIONAL DEVELOPMENTAL PROJECTS AND ENVIRONMENTAL GOVERNANCE IN PAKISTAN: THE CASE OF CPEC ENERGY PROJECTS

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Abstract

This research looks at the environmental governance procedures used for energy projects funded by foreigners in Pakistan as part of the China-Pakistan Economic Corridor (CPEC), a major project of China's Belt and Road Initiative (BRI). Because of the size and nature of its energy projects—many of which depend on fossil fuels—CPEC poses serious environmental concerns even as it promises substantial economic and infrastructure growth through improved energy security. A critical analysis has been carried out of the environmental frameworks in CPEC energy projects and their implementation. The institutional, legal, and policy frameworks controlling environmental supervision in these projects are examined, which also identifies weaknesses in implementation of environmental regulation on institutional level, public engagement, enforcement, and transparency. The study illustrates how governance issues impede United Nations Sustainable Development Goals (SDGs) by examining environmental impact assessments (EIAs), regulatory compliance, and community participation strategies. It goes on to address the compliance and significance of Pakistan's environmental regulations and the organizations' adherence to them and how it plays a part in the creation of global initiatives. To guarantee that economic progress under CPEC does not come at the price of environmental integrity, the study urges improved cooperation between Pakistani institutions and international investors, stronger environmental governance, and more transparent accountability procedures.

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INTRODUCTION

The atrocity of 2022 floods in Pakistan was a wakeup call for serious focus on climate action. The event brought monumental transformation in the country's climate change narrative on international platforms. The devastation caused a setback of not only 22% of the country's GDP but also fatalities, displacements and infrastructural damages on a massive scale. It is then when the country highlighted dire need for green international developmental projects in the country. The narrative has been propagated that Pakistan as a developing country requires industrialization as rapidly as it was for any developed state. At the same time assistance to deal.In addition to vulnerability to climate change, economic development and energy crisis are also major hindrances in prosperity for Pakistan. Due to which the Chinese investment in the power sector by becoming a part of Belt and Road Initiative (BRI) has come as a savior for Pakistan's energy needs. The development of the China-Pakistan Economic Corridor (CPEC) projects is of critical strategic importance with political ramifications, considering the two countries' all-weather strategic partnership. The CPEC projects are anticipated to yield substantial economic advantages for Pakistan through infrastructure, trade and investment, and employment prospects.

Generally, infrastructure development economic corridors pose negative effects on the environment resulting in the loss of animal and human habitats. Species that depend on these habitats frequently relocate as a result of this destruction, especially when corridors are involved. People moving away from one place put undue demand on other areas, which results in unjust recompense for those affected. The displacement of native populations is expected to lead to illegal migration leading to the spread of both chronic and non-chronic diseases, including infectious disorders.[1]

Similarly, with CPEC the possibility of environmental risks can also not be disassociated. Therefore, a critical analysis is devised of the environmental risks associated with the CPEC power plants and their influence on the sustainable development of Pakistan. Through a thorough and detailed investigation by analyzing few of the power projects the environmental price of development is to be understood. Exploring the reliance, necessity, economic feasibility at the same time the negative impact on environment of the non-renewable power plants. Thus, an in depth study of the power plants whilst highlighting the importance on environmental policies and legal frameworks associated with the establishment of developmental projects.

LITERATURE REVIEW

The literature review of the study has been carried out on exploring the climate change vulnerability of Pakistan which will lead to the understanding of the urgency of this study. Furthermore, forming the base of China Pakistan partnership through CPEC and then exploring the power projects of CPEC. The major themes will focus on an exhaustive exploration of existing literature on the environmental risks of developmental projects in general and CPEC projects in particular. Lastly, understanding the scientific and legal environmental regulations necessary for establishment of developmental projects.

According to Naveed, HE and Yasir Pakistan is presently facing regrettable issues as a result of climate change. Owing to its geographical location, the country is facing a severe risk from climate change. Additionally, there has been a greater dependence on domestic coal reserves in order to meet the 2010-2050 development plan. This change will result in more greenhouse gas emissions.[2]

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[1] Nga La Thi, "Social and Environmental Impacts of Economic Corridors, Regional Supports to address the impacts of Economic Corridors in the Greater Mekong Sub-region (GMS), South East Asia," (2008).

[2] Naveed M, He HS, Yasir QM, Du H and Satti Z, "Analyzing the Impact of Climate Change on Cotton Yield Using Spatial Analysis and Statistical Modeling in the Indus River Basin, Pakistan", *Ann Agric Crop Sci* 6, no.5 (2021): 1089.

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Pakistan, despite using coal for electricity, contributes minimally to climate change, making it a "climate injustice" sufferer. Despite this, the nation seeks technical and financial assistance to achieve its development goals. A study by Ahmed et al. found that rising net national income correlates with increasing natural resource depletion, highlighting Pakistan's need for sustainable economic development.[3]

Pakistan needs large-scale development projects like CPEC to meet population demands and achieve economic growth. However, environmental regulations must be applied equally, as China and Pakistan are not legally obligated to improve sustainability. Critics argue that CPEC has mild environmental issues, and without specific restrictions, these could impede Pakistan and China's development.[4]

Tao, Nida and Shahid et al have highlighted the security, environmental and bilateral components of the CPEC. The study emphasizes that domestic accountability and the eradication of corruption in Pakistan are necessary for the realization of a greener and sustainable growth of CPEC projects. It will result in an increase in the economy, which will eventually help to clear the way for sustainable development strategies. The study's findings provided direction for how China and Pakistan may strengthen the CPEC project through effective environmental protection measures, increased economic growth, and solid international ties.[5]

Sibtain et al.[6] state that deforestation, alteration to water quality and impact on the productivity of fisheries are among the environmental repercussions of dam building. Furthermore, things including organic waste, weathered rocks and chemical substances travel through rivers during construction of hydroelectric facilities and lead to sedimentation. Environmental risks are also posed by deforestation brought on by the construction of hydropower development projects.[7]

The country's supply-demand imbalance will be reduced by CPEC power projects, but there might be long-term negative environmental effects as well. Climate change is one of the most significant exteriorities of this century that the entire world is coping with, as determined by Rehman and Salman.[8]

While there are strict laws on environmental elements throughout the actualization of development projects, Environmental Impact Assessments (EIAs) have been neglected in the establishment of CPEC projects. Huang, Fischer et al. claimed that the CPEC investments will have a direct negative impact on Pakistan's water, air and wildlife.[9]

Numerous CPEC decisions have gone beyond legal requirements and environmental guidelines. It has been reported that the natural habitats of various species are in jeopardy due to the over 54000 trees that have been felled in Khyber Pakhtunkhwa province alone in order to enhance the road system under this project. Gilgit and Baltistan (GB) are experiencing same predicament at the same time. The stakeholders must reevaluate their decisions in light of

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[3] Vaqar Ahmed et al., "National economic and environmental development study: the case of Pakistan", MPRA, https://mpra.ub.uni-muenchen.de/30942/ (accessed 30 November,2022).

[4] Muhammad Faisal and Muhammad Usman Askari, "China Pakistan Economic Corridor and Sustainable Environment: Development, Impacts, and Policies," *Journal of Development and Social Sciences* 5, no. 2 (2024).

[5] Tao Xiaolong et al., "Exploring and validating the effects of mega projects on infrastructure development influencing sustainable environment and project management," *Frontiers in Psychology,* 12 (2021).

[6] Muhammad Sibtain et al., "Hydropower exploitation for Pakistan's sustainable development: A SWOT analysis considering current situation, challenges, and prospects," *Energy Strategy Reviews* 38 (2021).

[7] Benjamin K Sovacool and Lindung C Bulan, "Energy security and hydropower development in Malaysia: The drivers and challenges facing the Sarawak Corridor of Renewable Energy (SCORE)," *Renewable Energy* 40, no. 1 (2012).

[8] Centre for Environmental Economics and Climate Change (CEECC) Working Paper, "A district level climate change vulnerability index of Pakistan," https://pide.org.pk/research/a-district-level-climate-change-vulnerability-index-of-pakistan/ (accessed 30 November, 2022).

[9] Yanying Huang, Thomas B Fischer, and He Xu, "The stakeholder analysis for SEA of Chinese foreign direct investment: the case of 'One Belt, One Road' initiative in Pakistan," *Impact Assessment and Project Appraisal* 35, no. 2 (2017).

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environmental sustainability principles.[10] Similarly according to Wolf, the CPEC will significantly worsen Pakistan's natural environment while posing a comparatively greater harm to the environment in GB's mountainous region.[11]

Pakistan ranks fifth among the top ten nations sensitive to climate change between 1999 and 2018, and its ranking will decline due to the development of the CPEC. The country's terrain, ecosystem, and environmental condition are vulnerable to modern infrastructure, industrial sectors, economic zones, railways, power projects, and increased trade and business flow. Pakistan's mountainous regions, Hindu Kush, Himalaya, and Karakoram, are more vulnerable to high temperatures, leading to glacier receding. Despite China's urging to abide by the Paris Agreement, the CPEC's long-term plan does not pledge to do so. [12]

According to Ali and Askari, the implications of the CPEC on Pakistan's natural environment have been studied. They claimed that since the project's inception, it had significantly harmed the ecology and interfered with the life cycles of several species. The research states that when working on projects related to CPEC development, a plan for environmental preservation should be in place. For this reason, financing and policy should come from the government.[13]

Aslam claims that when working on building infrastructure in the CPEC, there is no framework, guidelines, or protocol for environmental protection. There have been several proposals for coal-based energy projects, and Pakistan's environmental danger is getting worse. The report concludes that global energy governance must be implemented as soon as possible under this plan.[14]

Ali, Sajjad and Haleem,[15] claim that the infrastructure projects of the CPEC have seriously disturbed the ecological and biodiversity. The "climate engineering" approach was proposed by the research as a fix for the environmental issues associated with the CPEC. Concurrent with CPEC, algae ponds, research locations, and carbon dioxide scrubbers would be constructed to track environmental changes and develop suitable countermeasures.

Khalid, Ahmad and Sami Ullah, examined in their study the dearth of conversation and debate surrounding environmental law in relation to the CPEC project's implementation. The report concludes that cooperation in the legal, ecological, and economic domains is necessary to resolve this problem and guarantee the sustainability of CPEC.[16]

The IPCC's fourth report warns of the severe implications of global warming on human health due to greenhouse gas emissions from human activities. The main gases contributing to climate change include carbon dioxide, nitrous oxide, methane, ozone, water vapor, sulfur hexafluoride, and chlorofluorocarbons. The Global Warming Potential (GWP) determines the distinct effect of each gas on the atmosphere, which is calculated on a 20- or 100-year timeline.[17]According to Bhattacharjee's analysis, The majority of CPEC energy projects include

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[10] Zofeen T Ebrahim, "CPEC and the environment: good, bad or ugly," *The Express Tribune*, 1 July 2017.
[11] Siegfried O Wolf, "China-Pakistan Economic Corridor (CPEC) and its impact on Gilgit-Baltistan" (2016).
[12] Shahid Khalil, "Policy recommendations for the impact of CPEC on climate change; a case study of gilgit baltistan", *Pakistan Geographical Review* 76, no. 1 (2021).
[13] Tayyaba Zainab Ali and Muhammad Usman Askari, "Impacts of the China-Pakistan Economic Corridor on the Natural Environment of Pakistan", *Pakistan Social Sciences Review* 7, no. 4 (2023).
[14] H Aslam, "CPEC & environmental sustainability", *South Asian voices,* https://southasianvoices.org/cpec-environmental-sustainability/ (accessed 20 July, 2023).
[15] Mahwish Ali, Wasim Sajjad, and Abdul Haleem, "Climate engineering: A strategic approach to combat environmental potential risks associated with Pak-China Economic corridor (CPEC) Development," *Reviews on Environmental Health* 36, no. 1 (2021).
[16] Iram Khalid, Tooba Ahmad, and Sami Ullah, "Environmental impact assessment of CPEC: a way forward for sustainable development," *International Journal of Development Issues* 21, no. 1 (2022).
[17] Adrian K Mohareb, Mostafa Warith, and Roberto M Narbaitz, "Strategies for the municipal solid waste sector to assist Canada in meeting its Kyoto Protocol commitments," *Environmental Reviews* 12, no. 2 (2004).

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coal power plants, which are the primary source of greenhouse gas emissions, according to the analysis.[18]

In Irum Khalid's research, the results indicate three potential environmental issues that might make Pakistan more vulnerable to climate change. The biggest threat comes from coal-fired power plants because of their pollution and CO2 emissions. Second, the CPEC route will have higher CO2 concentrations due to the removal of more than 54,000 trees for road infrastructure. Third, 36.5 million tons of extra CO2 will be released if vehicle trafficking on the Karakorum Highway alone is increased by up to 7,000 trucks per day. Reevaluating the environmental cost of CPEC is imperative. The report recommends that Pakistan and China work together legally and economically to address climate change concerns. To guarantee the safety, security, and sustainability of CPEC projects, environmental legislation has to be an essential component. The evaluation of CPEC's environmental effect centers on sustainable development choices that do not impose further environmental damage.[19]

The Environmental Impact Assessment (EIA) is a methodology used to assess the socioeconomic and environmental impacts of large-scale projects for sustainability. However, deficiencies in the EIA processes of the CPEC Western Road Project were found. The project's impact on air pollution, biodiversity loss, land degradation, and car emissions was highlighted. The EIA index for the project was 0.47, with a negligible correlation between environmental sustainability indicators and the project. This research aims to improve knowledge on long-term sustainability and provide an EIA index for implementing EIA processes.[20]

Therefore an exhaustive study and analysis of the existing literature directs towards Faisal and Askari's [21] assessment that not much research has been done on the connection between CPEC and environmental sustainability seems relevant. Thus a gap is evident where study on the environmental risks of power projects through case study method have not been studied yet. Which further comprises not only the policy but also legal environmental frameworks surrounding the developmental projects in Pakistan.

THE BRI AND THE CPEC

China launched the Belt and Road Initiative (BRI) in 2013 to establish connectivity between Asia, Europe, and Africa through a network of land and sea commercial routes. The plan, initially known as the One Belt, One Road plan, aimed to create an extensive infrastructure system including trains, energy pipelines, highways, and efficient border crossings. The plan aimed to extend westward through former Soviet republics and southward to Pakistan, India, and Southeast Asia. The Silk Road Initiative (BRI) aims to improve regional interconnectivity, streamline trade and investment processes, and promote economic integration across the Eurasian continent through development projects like the Silk Road Economic Belt and 21st Century Maritime Silk Road. The BRI now encompasses 147 nations, representing almost two-thirds of the global population and 40% of the world's total GDP. China has not only invested in physical infrastructure but has also provided funding for several special economic zones, which are industrial regions specifically established to provide employment opportunities.[22]

The China-Pakistan Economic Corridor (CPEC), connecting China to Pakistan's Gwadar Port, is expected to be the largest project to date, valued at over $62 billion. China has invested

[18] Dhrubajyoti Bhattacharjee, "China Pakistan economic corridor," *Available at SSRN 2608927* (2015).
[19] Ibid.
[20] Z Saqib et al., "Environmental Impact Assessment (EIA) of CPEC road project by following EIA index approach for sustainability," *European Journal of Sustainable Development Research* 7, no. 3 (2023).
[21] Ibid.
[22] CGD, "China's Belt and Road Initiative Heightens Debt Risks in Eight Countries, Points to Need for Better Lending Practices", Center for Global Development, https://www.cgdev.org/article/chinas-belt-and-road-initiative-heightens-debt-risks-eight-countries-points-need-better (accessed 14th November,2022).

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around $1 trillion in BRI projects, with an estimated $8 trillion expected during the initiative's lifetime. The BRI is seen as a potential economic progress and regional ties consolidation.[23]

CPEC PROJECTS

The China-Pakistan Economic Corridor (CPEC) project is divided into short-term, medium-term, and long-term phases. The short-term projects are divided into two phases: Phase I, which includes Early Harvest Projects (EHPs) by 2018; Phase II, which focuses on energy project infrastructure construction by 2020 or 2021; and Phase-III, which aims to create industrial parks and special economic zones by 2025. The Long-Term Plan (LTP) serves as a conceptual framework for the project, with Phase-IV focusing on railway infrastructure development and other long-term projects. CPEC, a popular and well-supported Pakistani energy project, aims to meet domestic and industrial energy requirements. With 14 projects completed so far, including coal, wind, hydro, and solar power, the project is expected to be completed by 2018. Currently, there are two ongoing projects and five under active consideration, with the remaining two incomplete initiatives being the Suki Kinari Hydropower Project (884 MW) and the Coal-Fired Power Projects (CFPPs) at Gwadar (300 MW).[24]

CPEC COAL POWER PROJECTS; ENVRIONMENTAL RISKS AND REGULATIONS

SAHIWAL COAL POWER PLANT:

The Sahiwal coal power station is located in the Punjab province, fifteen kilometers northeast of Sahiwal. The power plant's first phase would have two 660 MW units with a combined 1,320 MW of electricity producing capacity. A second phase will come with two 1,000 MW power plants. Super-critical technologies will be employed by the facilities to generate electricity. Huaneng Shandong Rui Group, a Chinese business, will be funding it. Sub-bituminous coal sourced from South Africa and Indonesia will power the facility. When producing all of the electricity, the plant's efficiency will be 42.11%.On the plant site, 95% of the civil work has been finished. It is anticipated that the factory will open for business in October 2017 and begin operations.[25]

Although the data provided by the official CPEC website reassures that although there are environmental concerns, many advanced technologies are being used to specifically curb the carbon emissions. On the other hand, according to a recent study done by the National University of Science and Technology; Two types of coal are used in this plant: 50% bituminous coal from South Africa and 50% sub-bituminous coal supplied from Indonesia. After a detailed calculations the coal consumption of the plant is 448.2 Mt/year and the resultant emissions are 988.36 metric tons of CO2 per year.[26]

THAR COAL POWER PLANTS

The coal-fired power plants in Pakistan depend on local rich coal resources, calculated up to 185 billion tons, of which 95% coal is situated in the Thar coal fields. Thus, Pakistan was forced to establish coal-fired power plants through the CPEC to address its energy shortages and the absence of expensive equipment to obtain energy from sources of renewable energy (such as solar, wind, and tidal).[27]

i) ENGRO, THAR BLOCK II COAL -FIRED POWER PLANT (1,320 MW)

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[23] Shahbaz Rana, "Chinese currency to get same status as the US dollar in Pakistan". *The Express Tribune*, 18 December 2017.

[24] Hadiqa Mir, "A decade of CPEC- an appraisal," ISSRA, NDU August 10, 2023, https://www.ndu.edu.pk/issra/pub/insight/2023/A-DECADE-OF-CPEC%E2%80%93AN-APPRAISAL/A-DECADE-OF-CPEC%E2%80%93AN-APPRAISAL.html

[25] CPEC working paper series, "Analyzing environmental impacts for coal - fired power plants under CPEC", https://cpec-centre.pk/working-papers/ (accessed 16 November,2022).

[26] Q.A. Ali, U. Khayyam and U. Nazar, Energy production and CO2 emissions: The case of coal fired power plants under China Pakistan economic corridor, Journal of Cleaner Production, https://doi.org/10.1016/j.jclepro.2020.124974

[27] Ibid.

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The 660 megawatt Engro Thar coal power station was included in the list of CPEC's energy priority projects in December 2014.It was intended for the project to be finished by the second quarter of 2018. The second phase of the project was supposed to include the completion of an additional 660 MW unit. The lignite coal deposits in the Thar coal field are enormous. The coal from the Thar Block II coal fields is utilized to generate electricity. Every year, 3.8 million tons of lignite are needed. The project location is situated in the Thar block II coal resources, east of the province of Sindh, in the Tharparkar District. Block II contains 2 billion tons of total lignite deposits, enough to provide 100,000 MW of energy for 200 years. It is 20 kilometers from Islamkot city, which is close to the village of Singharo-Bitra. This energy project's dependability makes it a sustainable energy source that will aid in lessening the nation's energy issue. As of right now, the power plant is operational.[28]

Similarly, to calculate the emissions per year from block I of Thar coal power plant calculations as mentioned above are done on the same formula. Resultantly; "the annual CO2 emissions from two electricity generation plants of size 660 Mega Watt remains 5.34 metric tons CO2/year."[29]

[28] China-Pakistan Economic Corridor (CPEC) Secretariat Official Website, "660MW Engro Thar Coal Power Project", https://cpec.gov.pk/project-details/3 (accessed 25 May,2024).
[29] Ibid.

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ii) SSRL THAR COAL BLOCK 1-6.5MTPA THAR, SINDH

On September 24, 2012, Sino-Sindh Resource Private Limited (SSRL) was granted a mining lease in Block-I of the Thar coalfields. In block I of the Thar coal reserves, SSRL plans to start an open-pit coal mine with a capacity of 6.5 million short tons per annum. Two 330 MW electricity plants at the mine's mouth will be powered by local lignite coal reserves. The China-Pakistan Economic Corridor's (CPEC) energy priority projects include this one as well. Sino-Sindh Resources (SSRL) and Shanghai Electric Group Co., Ltd (SEC) have inked an agreement wherein SSR would provide SEC with extracted coal from block I of the Thar coalfields for the purpose of generating electricity for two 660MW mine mouth power plants. The project's Environmental Social Impact Assessment (ESIA) has finished. Sub-critical technologies will be used by the power plant to generate electricity. The operational commercial production project.[30] Ultimately; "the annual CO2emissions form this power plants equates to 12,800.07 lbs./year or 5.80 metric tons CO2/year e slightly higher than the Block I CO2 emissions."[31]

TABLE 1.1 CPEC ENERGY PROJECTS

	Project Name	Capacity (MW)	Estimated cost (US $ M)
1.	Port Qasim Electric Company Coal	1320	1980
2.	Sahiwal Coal-fired Power Plant, Punjab	1320	1600
3.	Engro Thar MW Coal-Fired, Thar	1320	2000
4.	Gwadar Coal Power Project, Gwadar	300	360
5.	HUBCO Coal power plant, Hub Baluchistan	1320	970
6.	Rahimyar Khan Coal Power Project, Punjab	1320	1600
7.	• SSRL Thar Coal Block 1 Thar, Sindh • SSRL Mine Mouth Power Plant	1320	1300 2000
8.	Quaid-e-Azam Solar Park, BWP, Punjab	1000	1350
9.	Dawood wind farm, Bhambore, Sindh	50	125
10.	UEP Wind Farm, Jhimpur, Sindh	100	250
11.	Sachal Wind Farm, Jhimpur, Sindh	50	1134
12.	Sunnec wind Farm, Jhimpur, Sindh	50	125
13.	Suki Kinari Hydropower Station, KPK	870	1802
14.	Karot Hydropower Station, AJK & Punjab	720	1420

Source: Ministry of Planning and Development, Government of Pakistan

PAKISTAN'S DEVELOPMENTAL PROJECTS and SUSTAINABILITY PARADOX

Pakistan has focused on developmental projects and energy production with giving little significance to environmental governance, needed to lead a sustainable developmental project. In order to meet the growing energy demands of the growing population, the unstable political leadership had focused on economic sustainability and foregoing the environmental outcomes. However, after the 2010 and 2022 floods there is a gradual shift towards cleaner and sustainable policies to prevent climate change's impacts. The goal is to adapt to the impact of climate change

[30] China-Pakistan Economic Corridor (CPEC) Secretariat Official Website, "1320MW SSRL Thar Coal Block-I 7.8 mtpa & Power Plant (2×660MW) (Shanghai Electric)", https://cpec.gov.pk/project-details/9 (accessed 28 May,2024).
[31] Ibid.

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induced by industrialization in the developed world, as well as mitigate any potential dangers arising from Pakistan's own developmental projects.

PAKISTAN'S ENERGY CRISIS AND ENERGY MIX

As of 2021, fossil fuels make up 63% of Pakistan's energy mix, with hydropower accounting for barely 25% and renewables accounting for less than 6%. The existing energy system is not robust to climate change.[32] In line to the Pakistan Bureau of Statistics (PBS) publication 'Trends in Electricity Generation 2006-07 to 2020-21', Pakistan's energy mix has changed throughout time. Because of rising electricity consumption, the percentage of thermal power progressively increased. A nuclear power plant was built in the early 1980s, and by 2008, the total production consisted of 65 percent thermal, 33 percent hydroelectric, and 2 percent nuclear. Based by the Economic Survey of Pakistan 2023-24, the energy mix now consists of 59.8 percent thermal, 25.4 percent hydroelectric, and 8.6 percent nuclear power. In addition, alternative electricity sources account for 6.8 percent of the entire mix. This over 60% dependence on thermal power implies depending on limited and more expensive fossil fuels.[33]

With 58.2% of the installed capacity, thermal power production still accounts for the majority of Pakistan's energy mix. Nonetheless, its reliance on thermal energy has been gradually declining, suggesting an increasing trend toward alternative renewable energy sources. However, Pakistan is underutilising local renewable energy sources such as solar, wind, hydro, and biomass, which are less expensive and cleaner alternatives. As a result, Pakistan is dealing with a major energy crisis that impacts millions of people and has a negative influence on economic security.[34] Pakistan's dependence on imported oil, coal, and LNG exposes the country to price shocks, supply disruptions, and geopolitical threats. The government is encouraging private investments in power generation, particularly coal and solar power, to reduce reliance on imported fuels and maximize domestic resources. The partnership between the Ministry of Energy, private investors and China has led to successful projects like Suki Kinari, Punjab Thermal Power, hydropower, and Thar coal-based plants. However, these projects are expensive and heavily reliant on imported fossil fuels, causing concerns and prompting the government to explore other low-cost renewable energy sources.[35] As a result, Pakistan's energy prices are higher than those of countries in the region such as China and other adjacent nations, reducing competitiveness and inhibiting the expansion of the country's export-oriented sectors.[36] Pakistan is estimated to have 1450 million oil equivalent (Mtoe) of coal accessible.[37]

Given that government of Pakistan was "drawn to the potential of the untapped coal reserves in the Thar region," therefore provided incentives for the development of new coal-fired power facilities that used locally produced coal. The reasoning behind selecting coal over alternative energy sources is made abundantly evident by the NEPRA's statement in the generating license granted to the Port Qasim plant: "It is imperative that efforts be made to change the energy mix based on relatively cheap fuels. In view of the depleting natural gas reserves in the country and the relatively longer lead time for hydroelectric power projects to materialize, the coal power plants are considered the best option in the short- and medium-term planning. Therefore, to reduce the demand–supply power-gap and achieve sustainable development, it is vital that indigenous as well as imported coal projects are given priority for power generation and their development is

[32] International Growth Centre. "How reforming energy systems can tackle climate risks: Evidence from Pakistan," https://www.theigc.org/blogs/climate-priorities-developing-countries/how-reforming-energy-systems-can-tackle-climate-risks. (accessed 16 April,2024).
[33] Ghulam Mohey-Ud-Din, "Pakistan's energy mix and export competitiveness", *Brecorder,* 22 July, 2023.
[34] Ibid.
[35] https://pide.org.pk/research/pakistans-energy-outlook/
[36] Ibid.
[37] Lin, Boqiang, and François Bega. "China's Belt & Road Initiative coal power cooperation: transitioning toward low-carbon development." *Energy Policy* 156, (2021): 112438.

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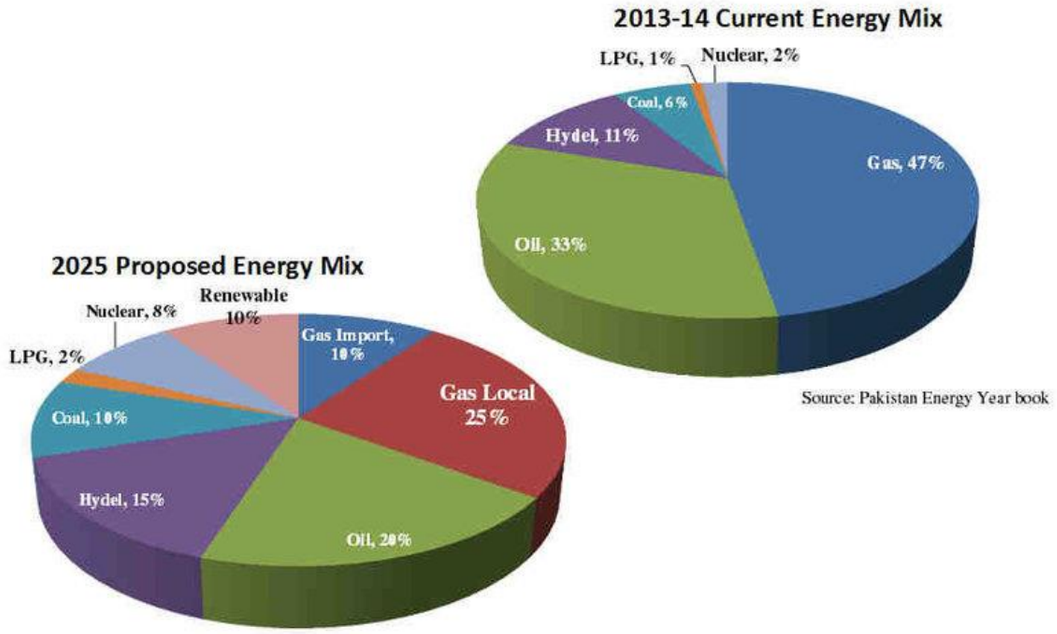
encouraged" –NEPRA 2015.[38] Extreme climatic events, like the 2022 floods, have damaged Pakistan's energy infrastructure, affecting the river system, which accounts for 25% of the country's electricity. Despite aiming for 60% renewable power by 2030, Pakistan faces challenges like lack of cooperation among government agencies and unclear responsibility allocation.[39][40]



[41]

PAKISTAN'S ENERGY PROBLEM AND CPEC PROJECTS

The results of the study demonstrate that CPEC is an easing agent for Pakistan's energy crisis.[42]In 2013 the government of the time put their fair share in curbing the ongoing energy deficit of Pakistan.[43] In 2018, Pakistan's energy deficit was 5000 MW, with 80% of the population having access to power.[44] The crisis significantly impacted the industrial sector, with an extra daily hour of unscheduled blackouts affecting annual income by 10%.[45] The "National Power Policy" was launched in 2013 to address the energy problem, aiming to overcome the supply-demand deficit by 2017 and generate an energy production surplus by 2018. The policy also emphasized the development of cheap energy sources.[46] Pakistan's primary power sources were natural gas and oil,

[38] Rishikesh Ram Bhandary and Kelly Sims Gallagher, "What drives Pakistan's coal-fired power plant construction boom? Understanding the China-Pakistan Economic Corridor's energy portfolio," *World Development Perspectives* 25 (2022).

[40] Climate Change Performance Index, "Pakistan - Climate Performance Ranking 2024", https://ccpi.org/country/pak/ (accessed 15 April,2024).

[41] Hali, Shafei & Kamran, Shah Muhammad. (2017). Impact of Energy Sources and the Electricity Crisis on the Economic Growth: Policy Implications for Pakistan.

[42] Sumera Iqbal, Jianxun Chu, and Shafei Moiz Hali, "Projecting impact of CPEC on Pakistan's electric power crisis," *Chinese Journal of Population Resources and Environment* 17, no. 4 (2019).

[43] Cookman, Colin, and Andrew Wilder. 2013. "Pakistan's Momentous Elections: Winners, Losers, and What It All Means." *Foreign Policy*, 15 May 2013.

[44] International Energy Agency, "Energy system of Pakistan", https://www.iea.org/countries/pakistan (accessed 20 April, 2024).

[45] Grainger, Corbett A., and Fan Zhang. "Electricity shortages and manufacturing productivity in Pakistan." *Energy Policy* 132 (2019): 1000-1008.

[46] Mirjat, Nayyar Hussain, Mohammad Aslam Uqaili, Khanji Harijan, Gordhan Das Valasai, Faheemullah Shaikh, and M. Waris. "A review of energy and power planning and policies of Pakistan." *Renewable and Sustainable Energy Reviews* 79 (2017): 110-127.

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but due to decreasing supplies and high oil costs, the government struggled to develop a viable energy mix. Despite discovering coal in the Thar area in the 1990s, local and regional insecurity hindered its development.[47]

PAKISTAN'S COAL CONSUMPTION

Pakistan's energy consumption has increased by 8.83% since 2017 before the CFPPs began, compared to 18.3% in 2023. Low carbon resources have also increased since 2017, but coal remains the primary energy source. Pakistan's coal consumption has grown by 8% over the last four decades, with brick kilns, cement, and power generation being the largest users. About 50% of imported coal is used in these sectors. The quality of coal, mostly lignite, is a major reason for not using local coal. The lack of a railway link between Thar coal sites and power plants is another concern.[48]

Despite Pakistan's distant coal reserves, substantial infrastructure is needed for its mining and transportation. The government's investment in the electricity sector is hampered by the nation's poor financial situation and investment environment. Additionally, late fuel collection results in power outages, which lowers revenue and starts a vicious cycle of circular debt that further impacts investments in the energy sector. To address this, the National Power Policy of 2013 aims to limit power theft, penalize non-payments, and increase transparency.[49]

Pakistan is relying heavily on coal for its power mix, despite environmental concerns and its Paris NDC promise to reduce emissions. The country plans to build 6.6 GW of new coal plants and add 11,353 MW by 2025, with a goal of 19% installed coal capacity by 2030. Despite progress, over 40 million people still lack access to electricity.[50]

Furthermore, through interviews it was noted that Pakistan's coal finance choices were more constrained as China emerged as the sole significant lender beginning in the 2010s. Pakistan's authorities carried out finance from a variety of sources such as big multilateral lenders. In interviews, officials underlined the hesitancy of the Asian Development Bank, Pakistan's largest development finance lender, to assist construct coal-fired power facilities in the early 2010s. The Asian Development Bank (ADB) approved a shift from heavy oil to coal electricity, but refused to fund other projects, despite the World Bank's 2013 policy limiting coal-power funding to rare circumstances.[51] China became the sole major financier for Pakistan's coal-fired power projects, increasing its capacity from 61 GWh in 2012 to 15,774 GWh in 2018, a collaboration between Korea and Japan, which helped the country reduce its energy deficit and secure funding for its energy projects.[52]

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[47] James E Fassett and Nasir A Durrani, *Geology and coal resources of the Thar coal field, Sindh Province, Pakistan*, (US Geological Survey 1994).
[48] https://file.pide.org.pk/pdfpdr/2023/573-589.pdf
[49] Ibid.
[50] Ichord Jr, Robert F. "Transforming the Power Sector in Developing Countries", Atlantic Council, https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/transforming-the-power-sector-in-developing-countries-geopolitics-poverty-and-climate-change-in-pakistan/ (accessed 4 May,2024).
[51] World Bank, "Toward a Sustainable Energy Future for All: Directions for the World Bank Group's Energy Sector", https://documents1.worldbank.org/curated/en/745601468160524040/pdf/Toward-a-sustainable-energy-future-for-all-directions-for-the-World-Bank-Groups-energy-sector.pdf (accessed 2 May,2024).
[52] Ibid.

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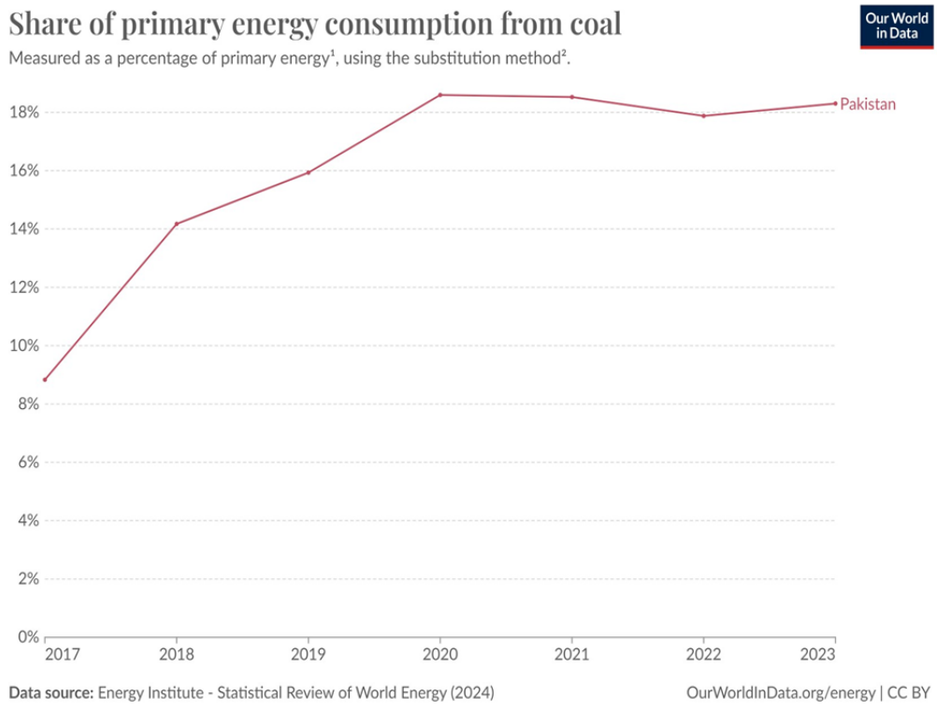

ECONOMIC VIABILITY OF USING NON RENEWABLE ENERGY SOURCES

Pakistan's import-dependent energy policy is unsustainable due to its limited foreign exchange reserves and the global commodity super-cycle caused by factors like the Russia-Ukraine conflict and COVID-related logistical issues. Pakistan has significant coal production potential but only produced 0.1% of the world's coal in 2021, with 67% of its total consumed being imported. In FY2021, Pakistan spent about US$ 1.5 billion on coal imports. The Sahiwal power facility purchased coal between June and December 2022 for around Rs74,000 per tonne, while publicly traded firms in the textile and cement sectors obtained coal for less than Rs45,000 per tonne.

The Sahiwal project requires 300,000 tons of coal per month, with an average cost of over $360 million per tonne. This could have been over $1.4 billion if more projects such as Port Qasim or China-Hub Power had followed suit. Nepra was unaware of these inflated acquisitions until January 2023 when the tariff regulating organization announced "Guidelines for coal procurement on a spot basis". The Sahiwal power facility reduced its energy production to Rs19 from Rs. 28-30 per unit, resulting in a 34% drop in cost.[53]

Pakistan's financing arrangements for CPEC projects may be questionable due to its focus on convenience for Chinese investors. The government's tariff payments include high return on equity, while Chinese and local investors are achieving profitable returns from coal-fired power projects. Pakistan's government offers incentives for coal-fired power facilities, making it economically competitive. NEPRA sets tariff prices for independent power producers, based on market understanding. Coal-based power is more competitive than renewables, with tariffs ranging between US $0.05 and US $0.07, much lower than the government rate for wind energy. This "upfront approach" to tariff rate setting demonstrates Pakistan's competitiveness in the market.[54] Thus, it may be inferred that policies pertaining to Pakistan's coal acquisition have been overlooked. Consequently, from an environmental standpoint, utilizing coal is no longer advantageous for consumers in terms of cheaper electricity. The Sahiwal and Port Qasim coal plants in Pakistan face economic and environmental challenges due to their long-term

[53] Khaleeq Kiani, "Questions arise over coal import for power plants", *DAWN,* 13 May 2024.
[54] Ibid.

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commitments. Research suggests that as gas and renewable energy become more affordable, coal plants may become stranded assets and burdensome on financial sheets.[55]

ANALYSIS OF POSSIBLE ENVIRONMENTAL RISKS FROM THE NON RENEWABLE PLANTS

PLANNED CPEC POLICIES AND ENVIRONMENTAL RISKS DUE TO COAL FIRED POWER PLANTS CFPPS

It is noted that originally, it was intended that all combined CFPPs would be operated using "modern and up-to-date ultra-supercritical emission reducing as well as emission capturing technology," which would include large-scale power generation combined with preventive measures, baghouse filters or electrostatic precipitators (ESP) with up to 99.9% removal efficiencies, or Low NOx Burner Technology (LNBT) with an efficiency of 40–60%.[56] On the other hand, none of the carbon capture and sequestration projects (CFPPs) have made use of cutting-edge or ultra-supercritical technology to lower carbon emissions or extract CO2 from the emissions.[57]

Moreover, the goal of Carbon Capture and Storage (CCS) was not achieved, which was to cut CO2 emissions by 50–80%. Additionally, the environment protection equipment that was planned before the plants were executed is rarely deployed. Examples of this equipment include dedusting, desulfurization, denitration, and high-efficiency electrostatic precipitators as well as flue gas desulfurization facilities. Similarly, other programs that promised to cut pollution by making effective use of the sixth-largest carbon store in the world went unfulfilled.[58]

In addition, it was said that this new technology will minimize emissions in order to prevent environmental deterioration, and that freshwater and marine life will not be harmed. However, in addition to severely harming Pakistan's (previous) reputation as one of the nations with the fewest carbon emissions, unprecedented carbon emissions are having horrifying effects on the ecosystem.[59] Concerns about the deterioration of air quality as a result of emissions from these facilities have been raised by the concerned federal institution during the discussion. Due to emissions and the open discharge of ash into the air, Punjab and Sindh provinces saw heavy smog during the summers of 2018 and 2019. This is a blatant indicator of air pollution. Therefore, the lack of an emission inventory beyond 2015 and the construction of such massive energy projects necessitate the recording of CO2 emission scenarios resulting from CFPPs as well as the assessment of the degree of air pollution that raises the average world temperature.[60]

ENVRIONMENTAL GOVERNANCE IN PAKISTAN ON CPEC PROJECTS

PAKISTAN'S ENVIRONMENTAL REGULATIONS

Pakistan's cycle of instability originates from political instability. Taking the example of the two contradictory statements on one issue we can easily understand the priorities of our political authorities. According to NEPRA's 'State of the Industry Report 2023' the high electricity rate was primarily due to the hike in the price of fossil fuels in the international market. Furthermore, the drastic devaluation of Pakistan's currency has increased the financial burden on the consumers as well as the financial sector. On the discussion of CPEC meeting it was said by PM that Pakistan would rely on local coal in the future instead of buying international coal. The planning is to further expand the Thar coal mines in order to save approximately $800 million annually. At the same it was noted that it would take a longer time and powerful convincing for the investors to shift their

[55] Ibid.
[56] Lonsdale, CR, RG Stevens, CA Brock, PA Makar, EM Knipping, and JR Pierce, "The Effect of Coal-Fired Power-Plant So 2 and No X Control Technologies on Aerosol Nucleation in the Source Plumes", *Atmospheric Chemistry and Physics* 12, no. 23 (2012): 11519-31
[57] Hussain Siddiqui,"The Coal Rush", *The News.*
[58] Ibid.
[59] Ibid.
[60] Ibid.

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fuel inputs and technology. On the other hand, since the world has gotten further aware of sustainable development goals, their necessity, as well as the unsustainable practices of any enterprise, the negative public opinion upon increasing coal mining could have been politically damaging for the authorities. Therefore, another statement was poured by the PM in later meetings saying; "only clean, cost-effective, and renewable power plants should be established in the future."[61]

EVALUATING CPEC PROJECTS UNDER ENVIRONMENTAL POLICY FRAMEWORK:

CPEC was previously managed by the Ministry of Planning Development and Reform (Ministry of Planning) and the Board of Investment (BOI), is now entering the implementation phase. The newly-formed China-Pakistan Economic Corridor Authority (CPEC Authority) will now assume exclusive oversight of CPEC projects, while China's National Development and Reform Commission (NDRC) serves as its counterpart.The CPEC Authority, under the federal government's direct jurisdiction, oversees the execution of CPEC projects and can incorporate environmental and social effects at any stage. The Ministry of Energy manages power generation projects, with renewable energy under the Alternative Energy Development Board (AEDB) and non-renewable energy managed by the Private Power and Infrastructure Board (PPIB-Power Board). The National Electric Power Regulatory Authority (NEPRA), established in 1997 under the Regulation of Generation, Transmission and Distribution of Electric Power Act of 1997 (RGTDEPA), oversees power generation safety, pricing, distribution, and supply, and establishes rules and regulations.[62]

The NEPRA as the primary regulatory body responsible for overseeing power generation and supply. Despite being directed by the EPA, NEPRA has not implemented any specific environmental rules and regulations as of now, even though it falls within their jurisdiction. The NEPRA and the Power Board rejected the EPA's efforts to carry out the IEE and EIA for the ongoing projects due to the pressing need to install power generation, supply lines, and transmission projects in Pakistan, which was experiencing a severe power supply crisis at that time.

The lack of regulation in Pakistan's overall ecological regime and environmental paradigms poses a significant threat from emissions, particularly greenhouse gases, generated by coal power projects. The primary coal-powered generation plants in the province of Sindh, as part of the CPEC, will be located in Thar. These plants will produce approximately 3000 megawatts of electricity. Additionally, there will be another plant in Karachi that will generate 1320 megawatts of electricity. A 300-megawatt power plant is currently being built in Gwadar, which falls under the jurisdiction of the Baluchistan EPA. Additionally, there is a 1300-megawatt power plant in the development stage in Sahiwal, which falls under the jurisdiction of the Punjab EPA. The NEQS Regulations for Ambient Air, which were established under the Climate Change Policy and Climate Change Act, are applicable to these coal projects. Both the provincial and federal EPA(s) have the authority to inspect these projects.

These projects are starting without the implementation of an Initial Environmental Examination (IEE) and EIA because they have been given priority under the legal framework of the CPEC. The implementation of environmental regulations and governance on power generation projects, through EIA or IEE prior to initiation, is hindered by the absence of effective coordination and overlapping jurisdiction among the EPA, NEPRA, and PPIB. The allocation of authority between the provincial and central EPAs is unclear when it comes to the specific implementation

[61] Shahbaz Rana, "All plants to shift to local coal", *The Express Tribune*, 16 April 2024.
[62] M. Jahanzeb Butt, "A comparative analysis of the environmental policies in China and Pakistan: developing a legal regime for sustainable China-Pakistan economic corridor (CPEC) under the Belt and Road Initiative (BRI)." *IPRI Journal* 11, no.1 (2021).

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of environmental protection regulations. The federal entities, namely the Power Board and NEPRA, do not grant authority to the provincial EPA(s) to carry out IEE or EIA assessments.

Environmental regulation analysis of the CPEC in addition to the aforementioned obstacles, there are additional issues of overlapping jurisdiction, disintegration and fragmentation of resources, and a lack of uniformity and clarity among the authorities and departments responsible for managing CPEC projects. The jurisdiction of the provincial EPA(s) and the federal EPA overlaps, as the Ministry of Planning and Board of Investment, which implement CPEC projects, fall under federal jurisdiction. In addition, the EPA(s) have not carried out rigorous IEE and EIA of the CPEC projects. Furthermore, the IEE and EIA procedures are outdated and lack clarity, as the CPEC projects utilize state-of-the-art machinery to construct contemporary infrastructure. Corporations involved in CPEC projects have already notified the EPAs that they adhere to China's Environmental Regulations, which do not align well with the actual environmental conditions in Pakistan. The formulation, implementation, and evaluation/accountability of these areas are characterized by intricate complexities and bureaucratic inertia.

The report by the International Union for Conservation of Nature emphasizes that the use of coal for power generation, increased shipping activity through the Gwadar port, and the expansion of special economic zones will have a detrimental impact on air quality in the country. These advancements have a substantial impact on generating large amounts of emissions, and addressing these environmental challenges necessitates a policy framework that incorporates air, marine, and terrestrial ecosystems.

As a result, Gwadar, a significant project under the CPEC, seems to have an uncertain future due to the absence of coordination among provincial, local, and federal authorities. The inefficiencies observed in Pakistan are not a recent occurrence; the evident failure of urban governance is clearly demonstrated by the recurring issue of flooding in Karachi. The conflict among authorities is present in nearly all urban areas, affecting not only environmental oversight but also social and economic stability. The challenge in implementing environmental regulation lies in the lack of effective monitoring and evaluation mechanisms, which hinders the fulfillment of international commitments made under the Aarhus Convention, UNCLOS, Stockholm and Rio Declarations.[63] (Counter check this reference by reading the paper and the content)

FINDINGS

China is considered not only to be the top emitter of carbon emissions globally but also many myths are associated with China's investment in the power projects of BRI states to be environmentally unfriendly.[64]Though China has mitigated fossil fuel consumption domestically, it is also investing upon the preference of the host country's resources. Therefore, negating all the myths regarding China's lack of susceptibility towards sustainable development.

Moreover, in the light of the unstructured interviews conducted, the quantitative researches done on these case studies as well as the documents available on the official websites, environmental risks have been identified. According to the interviews, the local population as well as the biodiversity of the region is getting effected by the power plants. In the case of the CFPPs, many local communities of the Thar region have been dislocated. Though they have been compensated under the CSR programs of the operating companies, many families have filed lawsuits against the concerned company. Furthermore, since those local communities of the Thar region were considered as untouchables, they are not treated equally in the displaced localities. Therefore, in the constructing phase as well as the operational phase of the power plants, there have been societal consequences of the CPEC power plants.[65] Similarly, the observations of the

[63]Ibid.
[64]Ibid.
[65] Rabiya Jaffery, "In Pakistan's Thar Desert, Opposition to New Coal Projects Grows", *The Diplomat,* September 26, 2019.

local people regarding the RE power plants have unveiled the never-talked-about environmental risks of solar and wind energy power plants in addition to the known damages caused by the hydro power plants.

The study has criticized the international structures for posing hypocritical regulations for the developing states in the time when the former need steadfast industrialization. This has been reiterated by the theoretical paradigm of green political theory where the international structures are the primary cause of the current environmental issues. The “Green Thought" has a more naturalistic viewpoint, it regards humans as a part of nature rather than differentiating or prioritizing them from the rest. The core idea of green thinking in development is "ecocentrism,” which centers the wellbeing of ecosystems. This idea is essential for evaluating the sustainability of development initiatives because it pushes policymakers to think about their decisions and how they will affect the environment rather than only concentrating on achieving economic growth.

Although Pakistan requires structural development to meet the energy needs of the country by investing more in renewable energy, the policy makers also need to implement the legal environmental policies required for sustainable development. China has been conducting more RE power plants under CPEC than in any other BRI participant state. Thus, trying to drift away from the conventional development paradigms and placing higher priority on economic growth than environmental health has been criticized by green theory. Furthermore, the theory notes that the international developmental initiatives ought to encourage international cooperation by utilizing common ecological ideals to advance sustainable practices. The idea of Green CPEC in pipeline is also furthering on the principles of fair and sustainable development techniques, making sure that environmental factors are included into all aspects of planning and execution.

CONCLUSION

Considering Pakistan’s vulnerability to climate change and lack of resources to completely shift to RE sources, the country is in a conundrum. Not only the country requires developmental projects to support economic prowess but also needs shift towards RE resources in order to protect the environmental degradation. Similarly, on the international forums the state is pursuing the notion of ‘climate justice’ in order to plead the case that developing states such as Pakistan are bearing the brunt of the industrialization done by the developed nations. After reviewing the gap in the existing literature lack of case study methodology on the environmental dimension of the CPEC power projects was found. Therefore, the study has highlighted the long term risks associated with CFPPs, it has also put stress on the need for development for Pakistan. Furthermore, the need is also for cleaner and cheaper sustainable power generation in order to meet the energy requirement of the country. At the same time if fossil fuels are to be used there should be proper mechanism in place to filter the carbon emissions. Regulations as such should not only be on paper but also implemented in order to not be the cause of the problem for our own country.