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Between light and darkness: Pakistan's energy dreams in the belt and road initiative

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Pakistan's privileged geographical position in the region, which facilitates Beijing's connectivity projects, is increasingly undermined by the subordination of domestic priorities to an external donor, namely China. In certain ways, this logic aligns with the dependency theory perspective, highlighting persistent patterns of vulnerability and asymmetry in the global arena. This structural dependence raises concerns about Islamabad's strategic autonomy, economic development, and long-term sovereignty. By studying the emergence of new irregular relations within South–South dynamics, this article challenges the conventional North–South framework, thus expanding the analytical scope of International Relations. We argue that this relationship exemplifies a new form of imperialism, evident in the unequal interactions between strong and weak powers within the developing world. This contribution is exemplified through the analysis of the strategic dilemmas arising from Chinese support to Pakistan's energy sector, through the lens of a realist approach, seeking to determine to what extent these investments strengthen state sovereignty or deepen its exposure to contemporary forms of subordination. This article employs a qualitative approach grounded in International Relations, combining realist and dependency theory perspectives. It analyses primary and secondary sources, including policy documents and scholarly literature, to assess how CPEC energy projects affect Pakistan's sovereignty and strategic autonomy. The findings suggest that the Sino-Pakistani relationship illustrates a new form of imperialism within the Global South, where stronger states influence weaker partners through economic and strategic leverage. This challenges the conventional North-South dependency framework. While Chinese support enhances Pakistan's material capacity, it simultaneously deepens exposure to subordination, raising critical questions about sovereignty under asymmetric partnerships.

KEYWORDS

China, Pakistan, BRI, CPEC, energy, structural asymmetry, South-South relations and dependency

1 Introduction

What began as a diplomatic business cooperation—both in terms of scope and project scale—has, over the past decades, evolved into a comprehensive strategic partnership between the PRC and IRP. It is a special relationship, regarded as the most stable and durable within Chinese foreign policy, encompassing a coordinated alignment of strategic objectives (Garver, 2001, p. 187). With the launch of the Belt and Road Initiative (BRI) in 2013, the rapprochement gained a new dimension, particularly due to the related China–Pakistan Economic Corridor (CPEC), one of the most symbolic components of the initiative. Through the BRI, China invests heavily in infrastructure and trade, promoting economic integration with countries in Asia, Africa, and Latin America. Named the “project of the century” by Xi Jinping, the BRI places China at the center of the international economic order and serves to project Chinese

power (Silva, 2019; Xinhua, 2017). If we take into account the broad range of sectors targeted by Chinese assistance, the fragile energy sector of the Islamic Republic stands out as a prominent recipient. Although often framed in terms of mutual benefit and reinforced by the symbolic narrative of an “ironclad” friendship, growing asymmetry in Pakistan–China relations highlight structural imbalances and questions the partnership’s long-term viability. Far from fostering sustainable economic diversification and modernization, the relationship instead seems to reinforce enduring cycles of external dependency—across economic, energy, technological, and geopolitical domains—which may, over time, significantly constrain Pakistan’s strategic autonomy. Despite Pakistan’s strategically privileged location, its persistent inability to achieve sustained development remains difficult to explain (Durrani et al., 2017). This condition appears to stem from structural dependencies, particularly the reliance on external support in critical sectors such as energy. Moreover, regional rivalries and internal tensions significantly constrain the country’s ability to capitalize on its geopolitical position within the framework of international trade and the BRI. The usually cited Chinese colloquial proverb—“Give a man a fish, and you feed him for a day; teach a man to fish, and you feed him for a lifetime”—ironically reflects this dynamic: rather than becoming empowered, Pakistan may remain subservient within an asymmetric system. Is it really like that? To what extent do these investments function as catalysts for sustainable development, or alternatively, reinforce IRP’s subordination to a dominant international actor? This constitutes the central question of this article, anchored in a realist framework of International Relations theory that conceives states as rational actors guided by interests in power and security (Mearsheimer, 2001; Morgenthau, 1948). From this perspective, the analysis examines how China employs economic instruments—particularly energy investments—as extensions of its structural power, shaping the strategic trajectories of its partner countries. In a similar line of reasoning, Waltz (2002) underscores that states are not solely driven by expansionist ambitions but also by the imperative to maintain their relative position within the international hierarchy—to preserve their prevailing status. Though grounded in a North–South dynamic—between developed and developing countries—this analysis draws upon the conceptual tools offered by Dependency Theory. Emerging from Marxist thought, this theoretical framework sheds light on the long-term consequences of large-scale investments in peripheral economies and the extent to which they may compromise national sovereignty and decision-making autonomy. Dependency Theory articulates a global division between a dominant core and a subordinated periphery, wherein developing countries are subjected to structural constraints imposed by the global economic order. Amin (1976), *inter alia*, argued that dependency is not only expressed through debt but also through hindrances to innovation, absence of alternative development opportunities, and circumscribed command over home country means of production. Scholarship continues to debate whether the BRI signifies a coordinated grand strategy from China for exercising regional and global hegemony, or whether it is an incoherent collection of domestic interests, policy instruments, and institutional agents. While criticisms of the BRI’s opacity, debt implications, and geopolitical undertones are

valid, the counterargument is also presented that it still offers new opportunities for global cooperation—if such cooperation adheres to norms of transparency, accountability, and good governance.

This article endeavors to examine China’s Pakistan investment strategy and political implications in the energy sector of Pakistan, with special focus on their effect on national sovereignty. Specifically, it assesses the extent to which these investments contribute to the enhancement of IRP’s energy autonomy or reproduce asymmetrical patterns of subordination. By inverting Dependency Theory to examine dynamics within the Global South, this study challenges the prevailing win–win narrative of South–South cooperation. It opens an underexplored analytical horizon, demonstrating that relations framed as strategic partnerships may also reproduce patterns of asymmetry, vulnerability, and structural dependence. It is relevant to assess, for instance, the constraints shaping foreign policy orientations, as well as the limitations affecting decision-making processes and access to national infrastructure. The central hypothesis is that the shape and structure of these investments constrain Islamabad’s strategic autonomy and make it vulnerable in the face of an emerging global power. It consists of four main sections. The first places the strategic salience of energy within the Belt and Road framework as one of the project’s geopolitical ambitions’ chief pillars. The second scrutinizes the Sino–Pakistani relationship—always described as a pillar of the BRI—with particular emphasis on the energy factor as a catalyst of increased strategic interdependence. The third reviews the Pakistani energy sector, both its structural weaknesses and prospects. The conclusion discusses China’s moves in this sector and evaluates if such efforts are contributing toward developing Pakistan or, conversely, reinforcing long-term dependency trends.

2 The geopolitics of energy in the BRI

Energy is a key strategic weapon in world affairs and one of the pillars of PRC’s global projection in the 21st century. The turning point was in 2013 at Nazarbayev University in Astana, Kazakhstan, when Xi Jinping unveiled the Belt and Road Initiative (BRI) as part of his greater initiative to restore the nation and position China at the heart of Asia and beyond (Economy, 2018). In January 2025, China’s Ministry of Commerce (MOFCOM) released new data on investments and contracts carried out under the BRI, reporting the implementation of 700 international aid projects between January and November 2024. By the end of that year, the initiative encompassed 149 countries and 32 international organizations worldwide (Nedopil, 2025). It is worth noting that the BRI promotes the development of partnerships, both public and private, establishing contacts from South Asia and the Indian Ocean to Central Asia and Europe (Leandro, 2018). Sino–Pakistani initiatives align with Beijing’s diplomatic ambition to prioritize the developing world, although part of the relationship is also driven by geopolitical motivations. This reflects a kind of legacy from the spirit of Bandung, which brought together the developing world in 1955. PRC now looks with renewed attention to developing countries, quietly positioning itself as a leader of the disadvantaged in order to achieve its political and diplomatic goals. China’s economic success since Deng Xiaoping’s reforms and the policy

of opening-up has inspired many poorer countries, which have shown a willingness to accept Beijing's narrative and leadership, embracing its developmentalist rhetoric and, in some cases, tolerating authoritarian tendencies. A report from CASS notes: "China's leadership role in the Global South is underscored by its increasing investments and diplomatic engagement, positioning it as a model for development cooperation." Shambaugh (2013) observes that "China offers alternative development models that challenge the hegemony of traditional Western powers." The "New Silk Road," with its maritime extension, involves the construction of ports, railways, highways, oil and gas pipelines, and fiber optic cables connecting Kashgar in Xinjiang to Gwadar on the south-western coast of Pakistan (Ali, 2017; Economy, 2018). It is also referred to as the 'central nervous system of the world' (Frankopan, 2019). In the framework of the BRI, the power generation and transmission infrastructure—oil and gas pipelines, hydro dams, power facilities, and power grids—have become central structural elements.

Promoting support with an emphasis on strategic and economic interests, China develops cooperation by incentivizing investment, trade, and infrastructure construction and does not exercise a hegemonic ideological agenda unlike in times of the Cold War. This approach expands China's presence and challenges traditional powers, yet it remains constrained by structural limitations that prevent it from exercising full global power (Shambaugh, 2013). Energy is not merely a technical or economic sector but an important component of state power, with significant implications for foreign policy formulation and national security. As Yergin (2020) notes, "rising incomes in China mean more building, more infrastructure, more cars, more air travel, and ever-more energy use." In 2024, China was the world's largest electricity consumer, accounting for one-third of global demand (EMBER, 2025). This position naturally implies a high dependency on the import of oil and gas, which has pushed the country to follow initiatives that ensure more stable and diversified access to certain resources.

Beyond resource acquisition, Chinese investments in the power sector serve as tools of geopolitical influence. Through the BRI, China aims to diversify its supply routes in this domain, reducing its need on the Strait of Malacca—a serious chokepoint for global maritime trade, through which approximately 80% of China's oil imports pass. In the case of a possible military conflict involving China, this passage could be targeted by adversaries (Myers, 2023). This explains projects such as the CPEC, which seeks to mitigate geopolitical peril through alternative overland routes. It is worth remembering the threats of a blockade in the Strait of Hormuz—following U.S. military strikes between June 4 and 6, 2025. Up to 20% of world oil and gas exports pass through the Strait of Hormuz, and any such disruption there will tend to cause a sharp rise in world energy prices (Slattery and Stewart, 2025). The New Silk Road assists Beijing in diversifying risks by avoiding easily blocked strategic chokepoints of rival geopolitical powers. Additionally, BRI projects lean more toward local community stability, especially in war zones and multi-ethnic areas. For example, social development programs in sectors such as health and education seek to promote the welfare of Pakistan's Baloch population. The recent past has seen some violent attacks by ethnic insurgent groups on

Chinese workers involved in infrastructure projects. To name a few examples: Baloch nationalists ambushed the Gwadar port complex on March 21, 2024, and ensuing multiple fatalities (India Today, 2024). There was an October 6, 2024, bomb blast on Karachi International Airport that resulted in the deaths of two Chinese nationals (The Times, 2024). Foreign development policies also aim to address Muslim populations within China itself. The sensitive situation of the Uyghurs in Xinjiang province illustrates this challenge. We note that Uyghurs—a Turkic, Sunni Muslim ethnic group with a distinct linguistic, religious, and cultural identity from the Han majority—have long been subjected to political, religious, and social control by the central government. Beijing justifies its repressive measures under the banner of combating Islamic extremism and separatism (OHCHR, 2022).

On the other hand, the BRI also facilitates the overseas industrial operations of China's state-owned enterprises (SOEs). It serves as a vehicle for accelerating China's internationalization in line with the "Going Out" strategy (also known as the Going Global initiative), promoted by President Jiang Zemin. Following the Tiananmen crisis, Jiang advocated for a more proactive engagement of Chinese enterprises in global economic dynamics. At the 14th National Party Congress in 1992, he emphasized that the country "should actively expand outbound investment and overseas operations" (Jiang apud Ye, 2020, p. 93). China's corporate offensive plays a key role in positioning the country in areas of vital strategic interest, particularly in regions rich in natural resources. A notable example is Zambia, where Chinese support for the energy sector is exemplified by the construction and financing of the Kafue Gorge Lower Hydropower Station (750 MW). This initiative—the largest of its kind in four decades—is often compared in both scale and ambition to China's own Three Gorges Dam (PowerChina, 2023). Constructed by Sinohydro and financed by the Export-Import Bank of China (CEXIM), the assignment aims to strengthen Zambia's electricity generation capacity and improve energy stability. However, Zambia faces serious challenges due to its growing financial dependence on China—most notably the risk of debt distress and a potential 'debt trap'. This concern is exemplified by Sri Lanka's experience, where rising debt forced the government to let the Hambantota Port to China Merchants Port Holdings for a period of 99 years. Alternative academic analyses have downplayed this conditionality, highlighting instead China's important role in Pakistan's development and its support at various critical moments in the country's history (Himmer and Rod, 2022). Moreover, cooperation under the BRI is regularly characterized by institutional opacity, as the specifics of financial agreements and project implementation take place beyond the public's sight. In several cases, infrastructure investments and credit lines are tied to long-term resource or energy supply commitments, reinforcing irregular power relations. In countries such as Pakistan, Sri Lanka, and across Sub-Saharan Africa, energy infrastructure serves as a tool of asymmetric interdependence, where the discourse of 'South-South cooperation' obscures underlying mechanisms of leverage and conditionality. Even as it celebrates unity, it also highlights internal contradictions and conflicting interests under the cloak of unity. Investment in infrastructure for power thus forms a core vector of Chinese foreign policy, increasing strategic partnerships, expanding China's presence in

geopolitically strategic regions, and countervailing the presence of the United States and the European Union. Meanwhile, the global energy order is being reorganized very deeply. China is a leader in forging new value chains—ranging from mining of important minerals to developing green technology and funding monumental projects. Contradictions continue, though. Even as there is increased focus on renewables, the majority of BRI energy undertakings remain based on the expansion of fossil fuels, and there are concerns about the environmental cohesiveness of the effort.

3 The China-Pakistan strategic partnership: entente cordiale

A commonly realist assertion is attributed to the statesman Lord Palmerston apud Ratcliffe (2016)¹: “We have no eternal allies, and we have no perpetual enemies. Our interests are eternal and perpetual, and those interests it is our duty to follow.” Following this perspective, we have grown familiar to saying that friendship is not a noun typically used in the realm of International Relations, yet the truth is that, among interests, some are more ‘friendly’ than others. Such is the case of the China–Pakistan relationship, described by John W. Garver (2001) as a form of “entente cordiale,” perhaps represents “the most stable and enduring component of China’s foreign relations” (p. 187). Over the past 60 years, these relations have developed from an initial foundation of mutual diplomatic recognition and joint efforts to attain international legitimacy (Silva, 2019, p. 120). Beijing is a partner in the balance of power that Islamabad maintains with New Delhi, which is deeply rooted in the partition of British India in 1947. This event led to the creation of the Pakistan and has since fueled a series of conflicts, particularly over the contested region of Kashmir. The country emerged as an independent nation and counted on Chinese recognition from the very beginning. The 1962 Sino–Indian border war was an essential trigger for enhanced partnership between both countries (Small, 2015), as regional frictions continued with new confrontations in 2021 and 2025. Pakistan actively supported China’s UN seat in 1961, endorsed the “One-China Policy,” and provided political backing after the 1989 Tiananmen Square crackdown (MFAPRCa, 2025; Wolf, 2020, p. 7–8). The 1965 India–Pakistan war marked a decisive turning point, laying the foundation for a long-term strategic partnership that transcended Cold War ideological divides. Despite ideological, cultural, and political differences, the two states are bound by a shared strategic purpose and converging priorities in regional dynamics—chiefly, limiting Indian influence in Central Asia and the Indian Ocean (Silva, 2019). The Islamic republic played a key intermediary role in the Sino–American rapprochement, organizing a secret visit by Henry Kissinger to China that opened the door to formal diplomacy between the two countries (Brown, 2017; Small, 2015).

China and Pakistan have long demonstrated strategic alignment on multilateral platforms, particularly through

coordinated diplomacy and mutual backing within United Nations voting blocs. Islamabad has consistently endorsed the “One-China Policy,” thereby reinforcing Taiwan’s diplomatic marginalization. In parallel, China has supported Pakistan’s positions on key regional matters, exemplifying a pragmatic partnership grounded in shared geopolitical interests. Notably, Islamabad has benefited from Beijing’s veto power in the UN Security Council to obstruct Bangladesh’s recognition and to secure favorable resolutions concerning Pakistani detainees (Siddique, 2014). The strategic alignment between the two countries was further deepened by Pakistan’s involvement in the post-9/11 War on Terror. Moreover, while Pakistan endorsed China’s observer status in the South Asian Association for Regional Cooperation (SAARC), China actively facilitated Pakistan’s full membership in the Shanghai Cooperation Organization (SCO) in 2017. For all these reasons the bilateral relationship is frequently described in poetic terms—“higher than mountains, deeper than oceans, sweeter than honey, and stronger than steel” (Ali, 2017, p. 1; Wolf, 2020, p. 9).

China has emerged as Pakistan’s main arms supplier, providing a wide range of equipment that has been modernized and intensified over time: JF-17 fighter jets, warships—particularly Type 054A/P frigates—Hangor-class submarines, guided missiles, CAIG Wing Loong II drones, and HQ-16 air defense systems. Between 2020 and 2024, China accounted for 81% of the value of Pakistan’s arms imports, a significant increase from the 74% recorded in the previous five-year period (George et al., 2025). China provides financial support, military training, space cooperation, and infrastructure support. The reluctance of some countries to sell arms to Pakistan was employed by China for diplomatic and strategic gain, despite also bringing benefits for both parts. Beijing also assisted Pakistan’s nuclear program, although it officially denies any involvement. According to reports, Abdul Qadeer Khan—Pakistan’s nuclear scientist—revealed in a letter that “a Pakistani C-130 departed from the Chinese city of Urumqi carrying enough uranium for two atomic bombs” (Corera, 2006; Ramana, 2011). On May 7, 2025, India and Pakistan became embroiled in their most serious military confrontation since 1971, following a deadly terrorist attack in Indian-administered Kashmir. In response, India launched air and missile strikes into Pakistani territory in an operation called *Sindoor*, which was met with Pakistani retaliation using drones, artillery, and missile systems. Although the conflict lasted only until May 10, it had significant repercussions for bilateral relations and regional stability. Pakistan’s deployment of advanced Chinese military systems—particularly drones and anti-aircraft defenses—demonstrated a high degree of precision and operational effectiveness (Chengappa and Sagar, 2025). The ceasefire marked a formal de-escalation, but tensions between the two states remain critical. During the conflict, China continued an ambiguous stance and particularly renounced from condemning the opening attack, underscoring its consistent bias in favor of Pakistan. Since the early 2000s, bilateral relations have expanded significantly, underpinned by clear geostrategic calculations. One milestone was the development of the deep-water port of Gwadar, which began its expansion in 2002 (Ahmed et al., 2019; Kardon, 2020). The Free Trade Agreement (FTA) signed in 2006 invigorated Pakistan’s financial sector and paved the way for the establishment of a currency swap arrangement. One of the central areas of

¹ See Treaty of Adrianople—Charges Against Viscount Palmerston”, <https://api.parliament.uk/historic-hansard/commons/1848/mar/01/treaty-of-adrianople-charges-against>.

the China–Pakistan relationship lies in infrastructure development support, which carries significant geopolitical potential. Pakistan occupies a strategic position. Expectations for cooperation under the BRI projects remain high; however, trade imbalances continue to be a significant concern, as China's exports to Pakistan substantially exceed Pakistani exports. The PRC maintained its position as Pakistan's largest import source in FY 2024, accounting for 27.0 percent of total imports (PBS, 2025). This country is at the intersection of three Asian sub-regions: South Asia, Central Asia, and West Asia. Its territory provides the shortest route to the ocean for all landlocked Central Asian states, as well as for China's inland provinces. In this context, the port infrastructures of Karachi, Qasim, and Gwadar along the Arabian Sea are of particular significance. Pakistan's relations with the Central Asian states gained renewed momentum on 28 November 1992 with the signing of the Charter of the Economic Cooperation Organization (ECO), which also included Iran and Turkey. Nevertheless, Pakistan's development remains constrained by geopolitical challenges, including rivalries with India, instability in Afghanistan, and the broader Sino–American strategic competition. For instance, India has systematically excluded Pakistan from its regional economic initiatives, while international sanctions on Iran have impeded projects such as the Iran–Pakistan (IP) gas pipeline (Abbas et al., 2024; Yusuf and Akhtar, 2023). Beijing has leveraged Pakistan's geographical potential and deepened its ties through the creation of the CPEC. This economic corridor was the first structural experiment under the BRI framework. It stretches from Kashgar to Gwadar and extends further toward Karachi. Gwadar Port and its adjacent Special Economic Zone have become strategic hubs, located near the Persian Gulf and the wider Middle East. Domestic ports are expected to play crucial roles in maritime logistics and economic growth, with significant impacts on sectors such as energy, trade, tourism, and fisheries (Wolf, 2020). It can be said that it served as an experimental model for future initiatives of the same kind in other countries (Gao, 2022).

Within this institutional framework, a plan was devised to support the recovery of Pakistan's poorly energy sector. Facing recurrent power shortages and underdeveloped infrastructure, the Islamic republic became a major recipient of Chinese energy investments. In 2000, then-President Pervez Musharraf proposed that his country could serve as a strategic “conduit for China,” welcoming port reserves to facilitate energy transit (Ali, 2017). In November 2014, both governments signed an agreement pledging to develop projects “based on market principles of openness, equality, and mutual benefit,” listing 14 as priority initiatives and another seven as actively promoted (Husain, 2021). Pakistan's infrastructure remains critically underdeveloped, requiring investment in water, irrigation, electricity, and transport systems (Wolf, 2020). During President Xi Jinping's 2015 visit to Pakistan, diplomatic and economic ties were consolidated through 51 agreements and an expanded investment package, including over \$46 billion pledged for power and development projects aimed at enhancing trade and regional cohesion (MFAPRC, 2015). According to official data, in 2024 Pakistan recorded a significant improvement in its external balance, with the reduction in the current account deficit largely driven by declining imports and increased exports, particularly in the rice sector (PBS, 2025).

In Pakistan, the energy mix is heavily reliant on fossil fuels, which make up 64% of total supply; hydropower contributes 27%, while only 9% comes from renewable and nuclear sources (IEA, 2021; ITA, 2021). Although Pakistan possesses military nuclear capabilities, the energy it produces is insufficient for civilian purposes. As a non-signatory of the Nuclear Non-Proliferation Treaty (NPT), the country faces significant restrictions in accessing nuclear technology through international markets. China remains an essential actor facilitating this process. Over 40 million Pakistanis still live without access to electricity, and approximately half of the population lacks clean cooking facilities. Also, Pakistan's trade imbalance with China remains serious—imports exceed exports fivefold. In spite of these asymmetries, political leaders from both sides continue to highlight the strength of the relationship. At the 2017 Belt and Road Forum in Beijing, attended by 29 heads of state, PRC and IRP announced an investment exceeding \$56 billion in CPEC (Sender and Stacey, 2017). Another less favorable dimension is that Islamabad maintains ties with regimes often regarded unfavorably in the international arena, such as North Korea, Myanmar, and Sudan. Its association with Islamic radicalism poses risks for PRC, particularly regarding the Uyghur issue in Xinjiang. Beijing remains cautious about entanglements with religious extremism and ethnic separatism. Additionally, Chinese assets and personnel along the Karakoram Highway have become targets for radical and insurgent groups, raising concerns about the sustainability of Chinese interests in volatile regions (Silva, 2019). Naturally, in its relations with India, China emerges as a strong supporter of Islamabad, described as “ironclad friends” by Wang Yi during a meeting with Pakistani Deputy Prime Minister and Foreign Minister Mohammad Ishaq Dar. Wang Yi emphasized that Beijing “firmly supports Pakistan in safeguarding its national sovereignty and territorial integrity, exploring a development path suited to its national conditions, resolutely combating terrorism, and playing a greater role in international and regional affairs.” (MFAPRCb, 2025). Implicitly, in the context of Sino-Pakistani cross-border disputes, this statement underscores the firm position of the Asian giant.

4 Pakistan's energy woes: structural challenges and strategic implications

At the time of Pakistan's independence in 1947, the newly established country had a very limited electricity generation capacity, estimated at around 60 MW. In the following years, this situation gradually improved, particularly during the era of Zulfikar Ali Bhutto (1973–1977), which was marked by relative economic development. Attention was given to industrial modernization and infrastructure expansion, which was also reflected in the increased electricity production capacity (Aslam et al., 2021). However, since its early days, IRP has struggled with a structurally fragile energy sector, marked by frequent shortages and a persistent reliance on imported fossil fuels. Around 65% of electricity production depends on these sources in this country, which exposes the national grid to volatility in global supply and price fluctuations. Although it has an installed generation capacity of 22,000 MW, actual demand frequently reaches 25,000 MW, creating a persistent

deficit of approximately 3,000 MW. A fundamental challenge is that electricity consumption has steadily exceeded economic growth rates, a situation exacerbated by rapid urbanization and the growing concentration of populations in major urban cities (Irman, 2020). Yet the core challenge lies not in generation capacity itself, but in the economic constraints stemming from the privatization of the energy sector. Initiated in the early 1990s, this process opened Pakistan's energy market to Independent Power Producers (IPPs), significantly altering the national energy mix. In 1980, hydroelectric sources accounted for 60% of electricity generation, while thermal sources—relying on fossil fuels like coal and oil—represented 40%. However, by 2010, the shift toward privatization had reversed this ratio: thermal energy surged to 70%, while hydropower declined to just 30%. Although thermal generation may offer short-term cost advantages, it relies on environmentally harmful and carbon-intensive fuels (Irman, 2020). The situation is especially critical in Karachi, home to over 20 million people and one of Pakistan's major industrial hubs. Between the late 20th century and the early 21st century, approximately 91 million national citizens gained access to grid electricity for the first time. As capital and technology gradually flowed into the country, key negative indicators began to improve. However, despite this progress, around 50 million people—equivalent to 26% of the country's population—still lack reliable access to energy (World Bank, 2021). Since 2017, driven by significant Chinese investments, IRP has notably decreased its oil imports. Thanks to this support, Pakistan is transforming into a country with a surplus in electricity generation capacity after decades of severe electricity shortages (Husain, 2021; Mangi, 2021). The country has prioritized investment in power plants over the electricity grid, leading to new challenges. While the new Chinese-built plants have increased energy supply, the ability to access and afford this energy remains limited—not only due to insufficient government subsidies but particularly among the general population. Since these costs are passed on to individual consumers rather than being covered by the state budget, electricity tariffs have risen significantly (Husain, 2021).

Another interconnected problem is the system of “circular debt”—a kind of “debts upon debts”, a cycle of public financial obligations driven by a persistent shortfall in régime subsidy payments. This mechanism involves a continuous accumulation of unpaid dues, particularly at the Central Power Purchasing Agency (CPPA), where the government's failure to cover subsidies leads to widespread payment delays. Public and private energy institutions such as the Pakistan Water and Power Development Authority (WAPDA), the Private Power and Infrastructure Board (PPIB), Generation Companies (GENCOs), K-Electric, and the Pakistan Electric Power Company (PEPCO) often default on payments, triggering a domino effect throughout the energy supply chain and contributing to recurring power shortages (Malik, 2020). In addition, energy theft—both by informal networks and organized criminal groups—is widespread, further exacerbating supply disruptions. As Aftab (2014) highlights, “the energy crisis” (significant restriction in the supply of energy resources) is the largest single drain on Pakistan's economy,” accounting for approximately 2% to 4% of GDP losses (Aftab, 2014; Patel and Zhao, 2014). All these constraints have serious implications for socio-economic development, particularly by undermining industrial competitiveness. According to recent estimates, the gap

between electricity demand and production ranges between 5,000 and 8,000 MW, with demand increasing steadily by 6–8% annually (Raheem et al., 2016).

In response to the country's electricity shortfall—estimated at around 25,000 MW—China has offered both technical and financial support to extract and utilize domestic coal resources (Hoodbhoy, 2017). However, the reliance on coal as an energy source stands out as one of the most difficult elements of Pakistan's energy revitalization strategy. A significant number of projects under CPEC depend on this material, raising criticism that China is effectively offshoring polluting industries to alleviate its own environmental pressures. While advocating for greener policies within its borders, Beijing continues to be the world's largest public financier of coal-based projects abroad. It has consistently resisted environmental standards promoted by developed countries, often justifying its position by pointing to its late industrialization and the demands of an export-oriented economy (Jacques, 2009). Several ongoing investments in IRP's energy sector continue to rely on fossil fuel and other highly polluting sources as their primary means of production (Table 1). Carbon, a fundamental element in organic chemistry, plays a central role in both biological systems and industrial processes. However, due to its contribution to greenhouse gas emissions and global warming, carbon-based fuels have become a focal point of environmental critique. Pakistan has historically depended deeply on foreign coal due to the low energy quality of its domestic supplies and insufficient infrastructure. However, with the development of the Thar Coal projects, supported by China, the country has sought to replace imports from countries such as South Africa with domestic coal. The Thar Desert (Tharparkar) contains one of the world's largest coal reserves, estimated to have enough resources to satisfy energy requirements for more than 300 years (Patel and Zhao, 2014). This shift helps Pakistan mitigate the risks associated with price fluctuations in international markets (Malik, 2025; Waleed, 2025). PRC is a major financier of this area of vast deposits located in the Sindh province. Under a 2016 bilateral agreement, 3.8 million tons are to be excavated annually to fuel a 660 MW power station (Cooke, 2016). The material extracted in Tharparkar is primarily lignite—a low-grade variety considered by scientists to be among the most polluting forms of coal. IEA (2021), executive director of the International Energy Agency, explained in an interview that:

“Coal is the single largest source of global carbon emissions, and this year's historically high level of coal power generation is a worrying sign of how far off track the world is in its efforts to put emissions into decline towards net-zero” (Birol apud IEA, 2021).

There is an urgent need to diversify Pakistan's energy by increasing the share of renewables, especially wind and solar, which are expected to make up 30% of the energy portfolio—alongside another 30% from hydropower (Mangi, 2021). Through SOEs, China's deploying engineers and proprietary technologies across fields ranging from “clean coal” and hydropower to nuclear energy. This transition is problematic, as Pakistan is between the countries most susceptible to climate change. In recent years, it has faced a growing number of climate-related tragedies, such as severe inundations, droughts, and deadly heatwaves (Cooke, 2016). Coal-fired power plants continue to pose serious risks to air quality,

TABLE 1 Key power plants in Pakistan.

Power plant name	Type	Capacity (MW)	Location	Status
Sahiwal Coal-fired power plant	Coal	1,320	Sahiwal, Punjab	Operational since 2017
Port Qasim Coal power plant	Coal	1,320	Karachi, Sindh	Operational since 2018
Hub (China Hubco) Coal power plant	Coal	1,320	Hub, Balochistan	Operational since 2019
Engro Thar Coal power project	Coal	660	Tharparkar, Sindh	Operational since 2019

Author’s own elaboration based on information from the CPEC China–Pakistan Economic Corridor Secretariat, *Government of Pakistan*. Available at: <https://cpec.gov.pk/>.

public health, and water resources, with long-term consequences for the economy. To reduce social unrest and local resistance, some investors have promoted job creation—particularly for youth and women—and launched modest social initiatives. One such effort is by the Sindh Engro Coal Mining Company (SECMC), which, in partnership with Chinese firms, has pledged to provide housing, education, and healthcare for displaced communities (Hoodbhoy, 2017). Despite these efforts, there is growing consensus on the need to speed up the transition to renewables, cut fossil fuel dependency, and reduce carbon emissions in line with global climate goals.

5 The China–Pakistan energy nexus: a geopolitical lifeline or a strategic trap?

Energy collaboration and support has emerged as a key pillar in China–Pakistan bilateral relations, especially under the frameworks of the BRI and the CPEC. The economic corridor was officially established during Prime Minister Nawaz Sharif’s inaugural visit in July 2013, marked by the signing of multiple Memoranda of Understanding (Adeney and Boni, 2024). For both nations, this partnership presents a strategic opportunity: it acts as a vital channel to secure energy supplies while simultaneously boosting their geopolitical influence in a region characterized by rivalry and instability, particularly concerning India. This country not only refuses to participate in the BRI but also views the CPEC as a threat to its sovereignty, particularly in the Kashmir region. Between 2015 and 2019, nine power plants were constructed under the CPEC, contributing a total installed capacity of 5,320 MW. By 2025, 14 projects had been completed, bringing the size to 9,504 MW (Malik, 2025). The five most significant plants are highlighted in Table 1.

A broad range of studies has identified CPEC as a transformative opportunity for Pakistan’s energy sector, with Chinese investments contributing to improved national energy security and infrastructure development (Ahmed et al., 2019). A notable example is the construction of infrastructure in Balochistan by the Chinese State Power Investment Corporation, which was responsible for part of the development of the Hub Power Company Limited (Hubco) project. In 2017, China Power Hub Generation Company Pvt. Ltd. (CPHGC), in partnership with a consortium headed by the China Development Bank and the Export–Import Bank of China, obtained financing of US\$1.5 billion to build a 1,320 MW coal-fired power plant and a port facility in this province (The News, 2017). This investment strengthened Pakistan’s power grid, reducing frequent blackouts that had previously caused significant economic losses (The Guardian, 2025).

However, several investments—such as power plants, distribution networks, port infrastructure, and oil pipelines—have been met with suspicion by local communities. This is exemplified by the construction of the new Gwadar Airport. Although lauded by the Islamic republic government, the project has raised concerns among some citizens. Azeem Khalid, a Pakistan–China relations expert, noted in an interview: “This airport is not for Pakistan or Gwadar; it is for China, to ensure secure access for their citizens to Gwadar and Balochistan” (Associated Press, 2025). There is a center-periphery distrust at play here, indicating a subjugation of the more vulnerable by the stronger party, which possesses greater technical and financial capacity (Galtung, 1971). This situation can be perceived as an example of Pakistan’s subservience to Chinese benefits, reflecting the core principles of dependency theory. This position of supremacy and peripheral treatment reflects the Sinocentric vision embraced by contemporary Chinese elites, inherited from the imperial period. From the ‘China Dream’ to the idea of rejuvenation under Xi Jinping’s governance, there is a clear attempt to reposition China at the center of Asia, if not the world (Abb, 2023). From this perspective, peripheral countries maintain asymmetric relationships with dominant powers, whereby the dependent state ends up serving the economic, political, or strategic interests of the hegemon—often compromising its own sovereignty and development. In the case of Gwadar Airport, Azeem Khalid’s observation suggests that the project mainly benefits China’s planned objectives instead of addressing the needs or aspirations of Pakistan or the local habitants of Gwadar and Balochistan. This exemplifies a typical dependency dynamic in which the recipient country cedes autonomy to a more powerful partner, undermining its sovereignty and potentially fueling internal social tensions. At same time, are fears that, in the event of regional conflict, energy supplies could be wielded as instruments of political coercion. As Pascal Abb (2023, p. 76) points out, the overall framework of cooperation, financing, and construction appears to support a “vision to rebuild a China-centric world order by infrastructural means”. It is further noted that, beyond the trade deficit, the government’s reliance on the profits of the State Bank of Pakistan—including risks associated with IMF loans and the swap line with China—makes prudent external debt management and the implementation of effective risk mitigation strategies essential to prevent the worsening of fiscal imbalances, as highlighted in the *Fiscal Risk Statement FY2024–25* (Government of Pakistan, 2025). In FY 2024, Pakistan’s trade deficit remained substantial, driven by high energy imports and limited export growth (PBS, 2025).

Another critical constraint is China’s near-monopoly as the principal foreign investor in these projects, which limits the

participation of other international actors and marginalizes local suppliers. This dynamic often generates conflict and hinders the development of Pakistan's domestic industries. This is yet another expression of the dependency relationship that develops between the actors involved. Consequently, these investments do not primarily foster the growth of a national energy sector but rather establish foreign-controlled infrastructure on Pakistani soil. This perceived neocolonial footprint has triggered popular protests against the Chinese presence, particularly in Balochistan, Pakistan's poorest region. Approximately 70% of population in this province is below the poverty standard, stressed to meet basic needs such as nutrition, housing, healthcare, and education. By comparison, poverty rates are 48% in Khyber Pakhtunkhwa, 45% in Sindh, and 30% in Punjab, with a national average of approximately 39.5% (PIDE, 2024).

Local communities often find it difficult to reconcile the construction of large-scale infrastructure with tangible improvements in their living standards. For instance, Gwadar Airport—the country's largest—offers little benefit to the city's roughly 15,000 residents, most of whom cannot afford air travel (The Guardian, 2025). Chinese investments are frequently perceived as primarily serving Chinese strategic interests and benefiting Pakistan's political elite, which contributes to recurring social tensions and regional conflict. An additional concern is that these Infrastructures isolated from the rest of the community, with Chinese personnel living separately in guarded compounds, creating a dynamic of dependence on external authority. Such conditions constrain Pakistan's autonomy in domestic decision-making, given that these compounds function in an entirely different realm—almost like sovereign embassies. Furthermore, IRP risks being instrumentalized in China's broader geopolitical rivalries with India and the United States, effectively losing autonomy in its foreign policy decisions. Chinese financing, often delivered through opaque mechanisms, has steadily increased Pakistan's external debt to PRC, exerting considerable pressure on the country's balance of payments. Pakistan's weak economic indicators rise the likelihood of debt default, as Chinese loans carry relatively high interest rates. However, it is also unlikely that Beijing would jeopardize its strategic relationship with Islamabad over financial matters, even if Pakistani assets are highly significant. Above all, any controversy surrounding CPEC would discolor the broader image of the BRI's success (Downs, 2019). Energy procurement contracts require Pakistan to pay fixed tariffs denominated in US dollars over several decades regardless of actual capacity utilization (IEEFA, 2024). While facilities like Gwadar's deep-water port and airport may lack immediate economic returns, they enhance China's strategic naval and aerial mobility in the Indian Ocean. Although the Chinese military presence in Pakistan remains limited, it has intensified to protect Chinese nationals and critical infrastructure linked to CPEC. The People's Liberation Army maintains some operational capabilities on Pakistani soil, accompanied by visits of Chinese naval vessels and submarines to Pakistani ports—signaling a discreet but real projection of Chinese naval power in the region. Pakistani authorities, however, consistently deny claims that China intends to establish a permanent military footprint in Pakistan (The Guardian, 2025).

Most power plants—thermal, hydroelectric, and renewable—are designed, constructed, and operated by Chinese state-owned enterprises. Although Dependency Theory traditionally focuses on the harmful role played by multinational corporations operating in free markets, it is important to recognize that Chinese companies also create dependency in the contexts where they operate. The exercise of power by the wealthiest over the most vulnerable remains central. These enterprises act as agents of penetration that are far from benign. Moreover, their relationships are established directly with local elites, effectively marginalizing the most vulnerable populations. As one critique notes:

“Since the basic terms of trade are unequal, these states have few external options. And they have few internal options either, since their internal constraints are just as real: land tenure and social and class structures” (Tony Smith apud Mingst, 1999).

This reliance restricts Pakistan's technical autonomy and complicates efforts to replace these strategic partners. Many installed technologies, such as turbines, are protected by intellectual property rights, compelling Pakistan to depend on China for maintenance, spare parts, and technological upgrades. While the influx of Chinese equipment boosts production capacity, it also entrenches structural dependence on Chinese supply chains and services, limiting opportunities for local firms and startups to compete (Wolf, 2020). Recent economic crises and political shifts in Pakistan have prompted efforts to renegotiate energy agreements, complicating investor protections and enforcement mechanisms. While initially driven by aligned elite interests, evolving political and economic contexts have placed these relations under increasing strain. Additionally, environmental criticisms have emerged due to reliance on polluting energy sources, fueling domestic discontent and influencing public perceptions of China's role—despite China's commitments to international climate goals, such as those agreed upon at COP26. In this context, the China-Pakistan energy cooperation nexus is a double-edged sword, offering strategic mutual benefits while also posing risks related to dependency, security vulnerabilities, geopolitical rivalry, and environmental sustainability.

6 Conclusion

Sino-Pakistani cooperation in the energy sector remains a cornerstone of their bilateral relationship, particularly under the China-Pakistan Economic Corridor (CPEC) framework. This partnership provides Pakistan with access to urgently needed energy resources and critical infrastructure, while enabling China to secure alternative routes to the Indian Ocean, reducing reliance on the vulnerable Strait of Malacca and expanding its strategic presence in Central and South Asia. Politically, China has gained considerable leverage through its close ties with Islamabad, positioning itself as a counterweight in the regional balance of power. For Pakistan, Chinese investment has been instrumental in addressing chronic energy shortages that have long constrained economic growth and domestic stability. However, the energy partnership carries significant risks.

Pakistan's increasing reliance on Chinese technological, financial, and infrastructural inputs entrenches structural dependency, trade deficits, constraining its sovereignty and strategic autonomy. Short-term gains are offset by long-term vulnerabilities, including debt risks, social and regional imbalances, and environmental pressures. This dependency is driven not only by market dynamics but also by the strategic push of Chinese state-owned enterprises, prompting analysts to recommend diversification of energy partners, enhanced transparency, and sustainable development strategies. Additionally, while energy cooperation yields immediate strategic and economic benefits, it exposes both countries to geopolitical tensions, social strains, and potential instrumentalization in broader China–India and China–U.S. rivalries, particularly in sensitive regions such as Kashmir and Balochistan. Despite its growth and energy security gains, Pakistan remains structurally reliant on Beijing. Islamabad's dependence undermines its policy autonomy, while China faces the challenges of regional instability and intensifying geopolitical competition. Moreover, despite PRC's promotion of green transformation under the BRI, fossil fuel projects continue to dominate, with significant environmental consequences. Sino-Pakistani energy cooperation thus functions as both a tool of strategic influence and a potential source of political, economic, and environmental vulnerability. The sustainability and equity of this partnership will hinge on Islamabad's ability to diversify energy sources and assert policy agency, alongside Beijing's capacity to reconcile strategic ambitions with responsible regional engagement. Ultimately, Pakistan may aspire to energy security and development, but it is Beijing that holds decisive influence over the switch.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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