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Analysis of the Impact Path of China-Pakistan Power Industry Cooperation on Poverty Reduction in Pakistan

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Abstract: Pakistan has been suffering from a power shortage, and the power supply is far from meeting the electricity demand of production and life in the country. The poverty of electric energy is both the cause and the result of Pakistan's poverty. So to make the people of Pakistan get rid of poverty as soon as possible, it is necessary to improve the electric power infrastructure. Since the construction of China-Pakistan Economic Corridor, the degree of China-Pakistan power cooperation has been deepened, and the development of Pakistan's power industry has ushered in a new period of opportunity. In this paper, we will analyze the basis of China-Pakistan power industry cooperation and study why cooperation between China and Pakistan can be realized. It also combines several cases to illustrate the positive impact of China-Pakistan power industry cooperation on poverty reduction in Pakistan. Of course, under domestic and international pressure, China-Pakistan power industry cooperation is facing many new difficulties and challenges. China and Pakistan must face these problems and strengthen dialogue and consultation to utilize better the role of power industry cooperation for Pakistan's economic development and social progress.
Keywords: China-Pakistan power cooperation; Energy; Poverty reduction; Case study

1. Introduction

In today's international community, poverty is a fact of life for millions of people, and energy poverty is its cause and consequence [1]. Pakistan is a relatively underdeveloped country.According to relevant data published by the IMF, Pakis national GDP per capita in 2021 is US$1505[2], and the national poverty rate remains at 20% - 30%[3]. Although the Pakistani government has actively promoted anti-poverty in recent years, the results have not been satisfactory. The phenomenon is mainly due to energy poverty, especially the shortage and backwardness of electric energy.

Development is driven by the ability of societies to develop new and better forms of energy, and access to energy per capita not only determines the progress of people but is inextricably linked to cultural development and the shape of modern societies in terms of who has access to and control over production[4] . Energy plays an essential role in a country's economic development and poverty reduction [5]. Among all the energy sources at this stage, electricity has received widespread global attention as the cleanest and most versatile energy carrier . Electricity consumption has become a primary macroeconomic indicator of a country, and solving the electricity problem is one of the most common ways to address energy poverty in countries around the world. However, about a quarter of the world's population still needs access to electricity resources. Various services provided by electricity, including lighting, cooking, cooling, telecommunications, education, water quality, health care, etc., are out of their reach[6] . The lack of electricity leads to a series of inequitable outcomes for political, economic, and social survival. Therefore, to address poverty in a country and achieve equality, it is necessary to secure the electricity supply. Pakistan is no exception to this rule.

It has been shown in the current stage of research that electricity plays a positive role in the development of the economy. For example, Mendes, Teixeira, and Salvato[7] used the Solow growth model to estimate TFP and stated that among the infrastructure factors, electricity has a positive impact on total factor productivity; Evelyn [8] used a regression distribution lag model (ARDL) to analyze the impact of energy consumption on poverty in Nigeria and the causal relationship between poverty and energy consumption. He concludes that current energy consumption will effectively reduce Nigeria's poverty. At the same time, energy consumption and economic development are closely linked, and the improvement and development of electricity infrastructure will positively contribute to the improvement of population quality and the reduction of poverty rate in a region [9]. However, it is necessary to note that although the development of electricity has reduced poverty to a great extent, solving the problem of electricity supply by the market and the people themselves is still difficult[10] . That not only because electricity development requires adequate finance as a guarantee, but more importantly, electricity as a necessity of contemporary life plays a vital role in the country's economic development and political It plays a vital role in the economic development and political

stability of the country[11] .According to the analysis by the International Energy Agency, with solid policies to back it up, 1.3 billion people will be connected to contemporary civilization by 2030[12].

In May 2013, the China-Pakistan Economic Corridor (CPEC) project was officially proposed, which provides an excellent opportunity to develop the power industry in Pakistan [13]. In order to help Pakistan solve the problem of insufficient power supply as soon as possible, the two governments have made constructing some power plants a priority project for implementation in the China-Pakistan Economic Corridor (CPEC). According to statistics, among the first batch of Chinese investment projects in constructing China-Pakistan Economic Corridor, 11 are about energy and electricity issues[14]. Since the construction of China-Pakistan Economic Corridor (CPEC), many scholars have conducted studies on its impacts, among which a large number of studies have shown that Pakistan will benefit from the construction of CPEC in several ways, especially in the field of poverty alleviation undertakings, where China-Pakistan cooperation will bring more benefits and advantages to Pakistani people. For example, Guo Yan, Dong Ruichang, and Wang Libin[15]reported in their study that China-Pakistan cooperation will bring considerable investments in Pakistan, boosting domestic infrastructure, increasing electricity supply, improving port facilities, and promoting industrialization. Guheqiang pointed out the importance of China-Pakistan Economic Corridor construction for anti-poverty in Pakistan through example analysis[16].

Although China-Pakistan power industry cooperation has enhanced the welfare of Pakistani people, it has faced many new issues in recent years as the international situation has become increasingly complex. It is well-known that regional cooperation and integration help to accelerate economic growth and economic disparities among participating countries [17], but cooperation between countries is not as simple as imagined under geopolitical, religious, and political conflicts.

Based on this, this paper first explains the basis of China-Pakistan power cooperation, explaining why it has been achieved and what challenges it will still face in the future; Then, it analyzes how Pakistan has benefited from the power cooperation between the two countries. In previous similar studies, most of them take data for quantitative research. However, due to the progress of society, science, and technology itself, it is difficult to exclude the interference of these factors, so this paper carries out the introduction of cases to analyze how China-Pakistan electricity cooperation contributes to poverty reduction in Pakistan through specific cases, which will add new perspectives and strong evidence for our study of China-Pakistan electricity cooperation.

2. Current status of development of Pakistan's power industry

2.1 Current status of Pakistan's electricity market

Regarding power structure, Pakistan is currently dominated by thermal power (coal, oil, and gas) and hydropower, supplemented by nuclear power and other renewable energy sources. As of June 2020, the total installed capacity of Pakistan is 38719 MW, including 24817 MW of thermal power, 9861 MW of hydropower, 1467 MW of nuclear power, 1248 MW of wind power, 530 MW of photovoltaic, 369 MW of biomass, and 427 MW of small private power plants (Fig.1) [18]. Regarding electric energy extraction, Pakistan has low domestic reserves of fossil energy, such as oil and natural gas, and high coal reserves. However, due to the poor quality of coal and limitations in extraction technology, the vast majority of thermal power plants in Pakistan currently rely on oil and natural gas imports for a long time, which also leads to a decline in foreign exchange reserves and an increase in the cost of power generation[19] . In order to achieve sustainable development and improve national energy security, the Pakistani government announced at the Climate Ambition Summit in 2020 that there would be "no new coal-based energy sources," emphasizing the reduction of investments in fossil energy generation projects and the development of renewable energy sources to achieve a 60% share of renewable energy by 2030[20].

Pakistan's domestic electricity market is up-and-coming, with total electricity generation in Pakistan reaching 104.18 billion watts in March 2022, up 16.2% year-on-year, according to data released by the Pakistan Electricity Regulatory Authority in April 2022 [21]. The IMF forecasts an average electricity demand growth of 4.8% for 2020-2047 under normal conditions in Pakistan's economy, with an average peak demand growth of 5 .1%. The peak growth is from 2036-2040, with an average annual electricity demand growth of 6.1%. Total electricity consumption in Pakistan is projected to be five times higher than in FY2018 by 2047 [22].

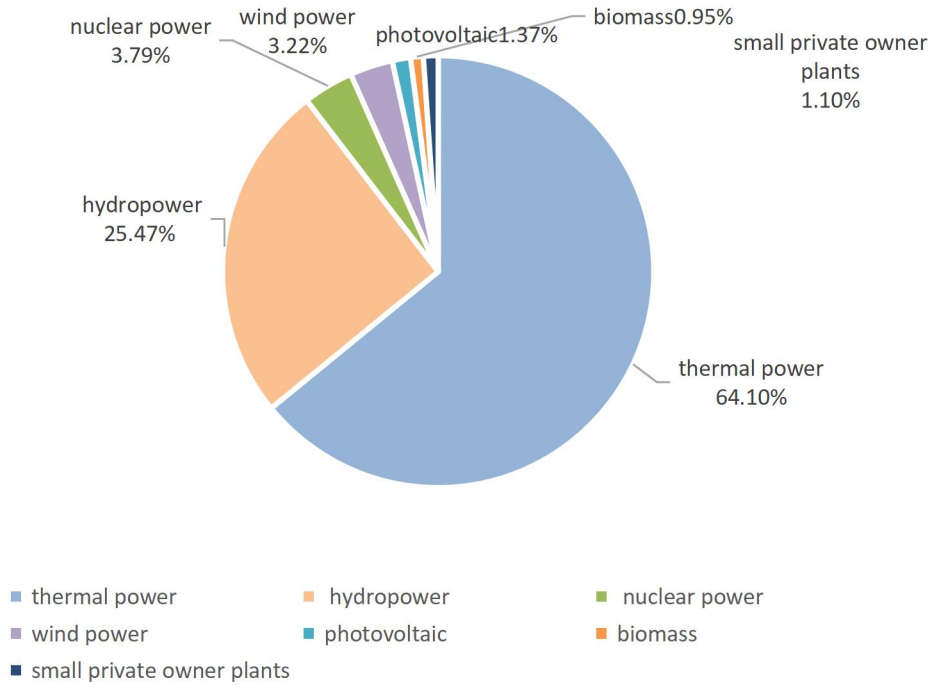


Fig.1 Power Structure of Pakistan

2.2 The current situation of electricity consumption of Pakistani people

The per capita electricity consumption of Pakistani residents is low. In 2015, for example, Pakistan's per capita electricity consumption was only 449 kWh, which is much lower than that of countries such as Turkey and Malaysia, which are at a similar level of development. Presently, electricity consumption in Pakistan is mainly concentrated on residential electricity consumption, which accounts for more than 50%, while industrial electricity consumption only accounts for about 20%, far below the world average. In 2022, affected by global high temperature, electricity consumption in many parts of Pakistan surged, and the national electricity demand is 26,000 MW, but the available power supply is only 19,500 MW. The power supply in many cities of the country needs to be increased. For example, Karachi, the largest city in Pakistan, still has some residents experiencing 8-10 hours or even longer daily power outages [23]. Inadequate electricity has become a significant factor in the lives of Pakistani people: in terms of living, insufficient power supply makes it difficult to educate and entertain people in many ways, and daily power cuts became the norm during the peak of electricity consumption in the summer of 2022, students even had to study with candles in the scorching heat. The summer heat and darkness at night also brought many troubles. In addition to the contradiction between supply and demand, the high cost of electricity also makes it impossible for many people with meager salaries to make ends meet and enjoy it. On the production side, the need for more electricity makes it difficult for many companies to continue production. According to Professor Karekezi[24] , a country is poor because of its poor performance in the demand and supply side of the economy.

Moreover, this poor performance pushes society into a vicious cycle of poverty. At the aggregate level, the lack of modern and cheap energy is considered a barrier to effective productivity, and this barrier exacerbates the vicious cycle of poverty [25]. Thus the lack of electricity supply, apart from creating constraints on domestic business development and impacting foreign investment, can, worse still, drive Pakistan more profoundly into the quagmire of poverty within the country from which there is no escape.

2.3 Pakistan Power Development Plan

The Integrated Generation Capacity Expansion Plan (IGCEP 2020-2047) [26] was developed by the Pakistan Electricity Regulatory Authority in 2020, which proposes future generation capacity expansion across various fuel and technology categories based on least cost principles. The Pakistani power sector is still developing, and the power supply is still dominated by traditional thermal power. As mentioned earlier, Pakistan is rich in coal resources, so the Pakistani government has made coal-fired power a priority development project. At the same time, the country also proposes to increase the share of renewable power from the current 4% to 30% by 2030 (Table 1), and the proportion of hydroelectric and renewable power generation should reach more than 50% by 2047 (Table 2). In this regard, the policy director of the Alternative Energy Development Commission of the Government of Pakistan said: "The objectives of the new plan will be implemented in phases, and by 2025, the first to achieve a 20% share of renewable energy in Pakistan's installed power generation capacity. Development areas will include wind, solar, geothermal, tidal, wave, and biomass."

Energy type		Installed capacity	Power generation
thermoelectricity	Indigenous coal	8%	13%
	Imported coal	7%	3%
	Blast furnace oil	3%	0%
	liquid gas	14%	9%
nuclear power		6%	13%
hydropower		27%	36%
renewable energy	photoelectricity	17%	9%
	Wind power	14%	14%
	biomass	1%	2%
Import		1%	1%

Sources:According to the power development plan issued by the Pakistani government
Table 1:Pakistan's Energy Structure in 2030

Energy type		Installed capacity	Power generation
thermoelectricity	Indigenous coal	20%	36%
	Imported coal	3%	1%
	Blast furnace oil	0%	0%
	liquid gas	18%	0%
nuclear power		3%	5%
hydropower		33%	42%
renewable energy	photoelectricity	16%	8%
	Wind power	6%	6%
	biomass	0%	1%
Import		1%	1%

Sources:According to the power development plan issued by the Pakistani government
Table 2:Pakistan's Energy Structure in 2047

3. Advantages and challenges of China-Pakistan cooperation in the power industry

3.1 The Realistic Basis of China-Pakistan Electricity Cooperation

3.1.1 A unique location

From the geographical location of China and Pakistan, Pakistan is located northwest of South Asia, south of the Arabian Sea, and bordering China in the northeast. The proximity facilitates the flow of people and capital between the two countries and reduces transportation costs, which creates a favorable environment for China-Pakistan power cooperation.

Pakistan's advantage, the country is located in the plate junction zone. The longest river, Indus, runs through almost the whole territory of Pakistan from north to south, providing conditions for developing Pakistan's hydraulic resources. The country is also rich in coal and natural gas resources. Today,the national coal resources are around 186 billion tons, ranking seventh in the world, and 605.6 billion cubic meters of natural gas[27].Meanwhile The country is rich in solar energy resources due to its tropical climate with generally high temperatures and low precipitation. In addition, the long and winding coastline gives wind resources and great room for development and utilization.

3.1.2 Good-neighborly and cooperative relations

Since the establishment of diplomatic relations in 1951, China and Pakistan have always upheld the Five Principles of

Peaceful Coexistence, made mutual progress, and supported each other in international cooperation. Since entering the 21st century, high-level interaction between China and Pakistan has been frequent, especially between 2014 and 2020, when Chinese President Xi Jinping interacted more closely with Pakistan at a high level, and "building a community of destiny between China and Pakistan is a strategic choice made by the governments and people of China and Pakistan in the fundamental interests of both countries."

In recent years, with the construction of the China-Pakistan Economic Corridor as the entry point, China and Pakistan have carried out in-depth exchanges and cooperation. The two countries have complemented each other's advantages and promoted deepening cooperation on an equal footing. The good bilateral relationship has laid a good foundation for China-Pakistan power cooperation, and when the Pakistani government released Vision 2030, it specifically issued two additional clauses to protect the electricity revenue of Chinese power investors ; In 2016, the Economic Commission of Pakistan's Cabinet (ECC) adopted another additional clause of the China-Pakistan Economic Corridor Framework Agreement to ensure that the China-Pakistan Economic Corridor is not affected by the power triangle debt and that Chinese investors and their partners receive their electricity bills promptly [28]. China is also actively promoting China-Pakistan power cooperation, sending a steady flow of its advanced equipment, talents, and capital to Pakistan.

3.1.3 Huge market demand in Pakistan

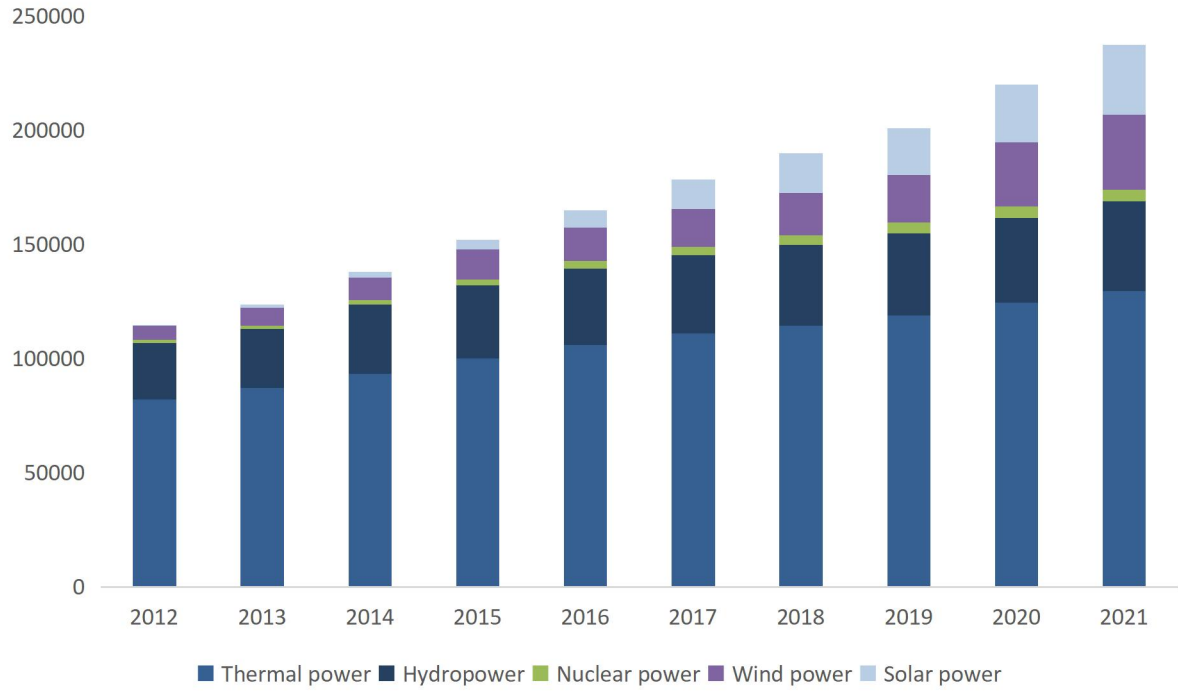
Pakistan is a developing country, and its domestic infrastructure still needs to be well developed. At present, the economy of Pakistan is highly dependent on agriculture, with agricultural income accounting for about 30% of the GDP[29] . However, due to the instability of agriculture and rapid global industrialization, the country's government has been actively restructuring the industry to promote the development of secondary and tertiary industries. The development of secondary and tertiary industries can only be achieved with a stable power supply system, but only about 30% of Pakistan's annual electricity is used for industrial production [30].

In addition to the requirements of industrial development, the demand for electricity from the population of Pakistan has been growing continuously. With population growth and urbanization in Pakistan, electricity demand is increasing. In late July 2009, people suffering from power cuts in the eastern province of Punjab and Karachi, the largest city in the country, took to the streets, pointing their fingers at the power companies [31]. High unemployment, poor education, and poor health care due to severe power shortages have become essential concerns of the people. On June 19, 2022, Pakistan's Punjab province introduced energy conservation measures, requiring night markets, shopping centers, and restaurants to close by 9 p.m. daily to deal with power shortages [32].

3.1.4 China's advanced experience and technology

China built a well-off society in 2020, and the poverty rate reduced from 88.1% in 1981 to 0. Behind the miracle of China's poverty reduction cause are the vital guarantee and great impetus provided by electric power, which is seen as the most crucial essential industry for national economic development and social progress[33].After the reform and opening up, China promoted the power industry of science and technology to achieve leaps and bounds by implementing many significant science and technology projects. Energy technology independent innovation capacity and equipment localization level significantly has also been improved. China's critical, independent technologies have reached the top international level (Fig.2). In addition, China's newly installed renewable energy power generation accounts for 40% of the world, and ultra-high voltage D.C. technology and source-grid-load-storage integration technology have enabled 100% of counties, townships, villages, and households to be connected to electricity [34], providing a reliable guarantee for rapid economic development.

With the implementation of the "One Belt, One Road" initiative, China's outward investment in electric power has shown explosive growth. Power grid, power generation, power construction, power equipment, and other power enterprises rely on the rich experience in the construction of hydropower projects, thermal power projects, wind farms, photovoltaic power plants, power grid projects, and continue to explore ways of foreign cooperation, through mergers and acquisitions, power engineering turnkey, power equipment output, international power trade, power standards, and power planning and other ways, so that the scale of foreign cooperation in electricity is expanding, the cooperation area is more; the scale of foreign cooperation of electric power is expanding, the cooperation area is extensive, and the cooperation field is becoming diversified.



Sources: China National Grid Annual Report（www.sgcc.com.cn）

Fig.2 Installed Structure of China Electric Power (2012-2021)

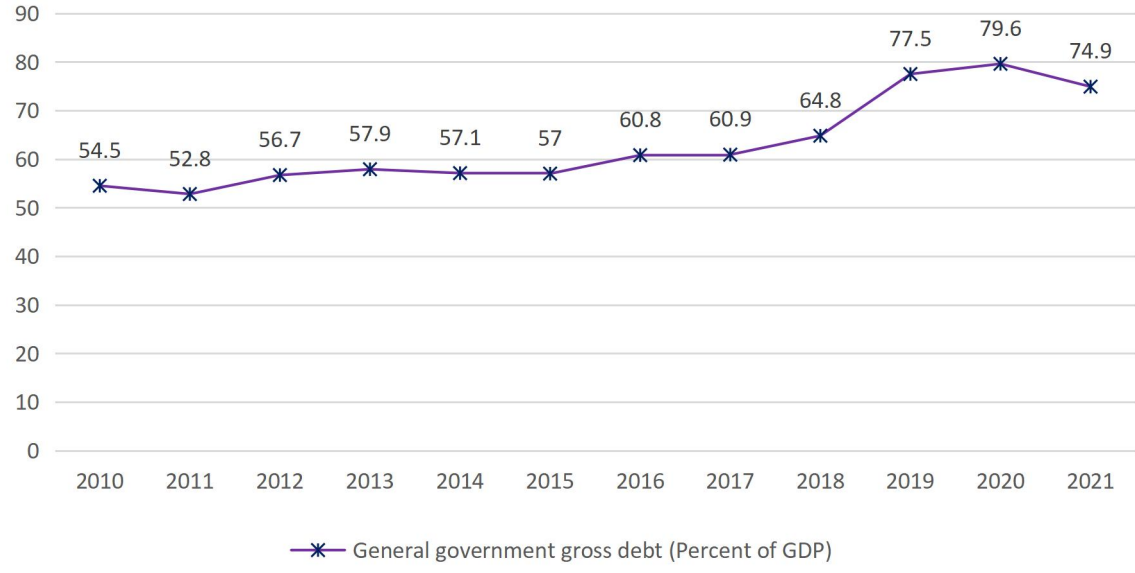
3.2 The reality and challenges of China-Pakistan power cooperation

3.2.1 Domestic political instability in Pakistan

Pakistan chose parliamentary democracy as its system of government when it gained independence in 1947. Nevertheless, after independence, this country has never been able to establish a stable parliamentary democracy as a system of government. The constitution has been repealed or discontinued several times, and the system of government has been unpredictable, with a cabinet system at times, a presidential system at times, and a military regime almost half the time[35]. To this day, Pakistan's domestic regime remains relatively unstable. The unstable domestic political situation has led to slow progress, extended schedules, and significant cost increases in some China-Pakistan power cooperation projects. In addition to regime change, Pakistan's domestic security issues are also prominent, such as the attacks on Chinese people in the China-Pakistan Economic Corridor by the Balochistan Liberation Army (BLA), a Pakistani terrorist organization. Bombing attacks to disrupt the China-Pakistan Economic Corridor project. In addition, forces such as ethnic separatism and religious extremism are rampant in Pakistan, and the personal safety of Chinese engineers sent abroad during power cooperation in Pakistan is often threatened [36].

3.2.2 Pakistan's high power costs and triangular debt problems

More than half of Pakistan's electricity still relies on oil and gas to generate electricity. Due to the relative paucity of oil and gas resources in Pakistan, coupled with poor technological experience, the dependence on imported raw materials for electrical energy is firm, which also makes the cost of electricity generation in Pakistan high. The government has adopted financial subsidies to maintain the cost of electricity for end-users to protect residents and enterprises and reduce the pressure on electricity consumption [37]， and to ensure the regular operation of various power generation, transmission, and distribution companies. However, political chaos and international instability have often left the government's finances in a state of overspending, making it challenging to pay massive subsidies promptly, which has led to electricity bill arrears for businesses and residents due to the lack of financial subsidies.Since the 21st century, Pakistan's government debt has been rising (Fig.3). Pakistan Electric Power Company is facing huge financial pressure, and its revolving debt situation in the power industry is likely to continue to deteriorate[38].



Sources:IMF (https://www.imf.org/en/Countries/PAK#countrydata)
Fig.3 General government gross debt (Percent of GDP)

3.2.3 Environmental protection puts new demands on traditional power generation models

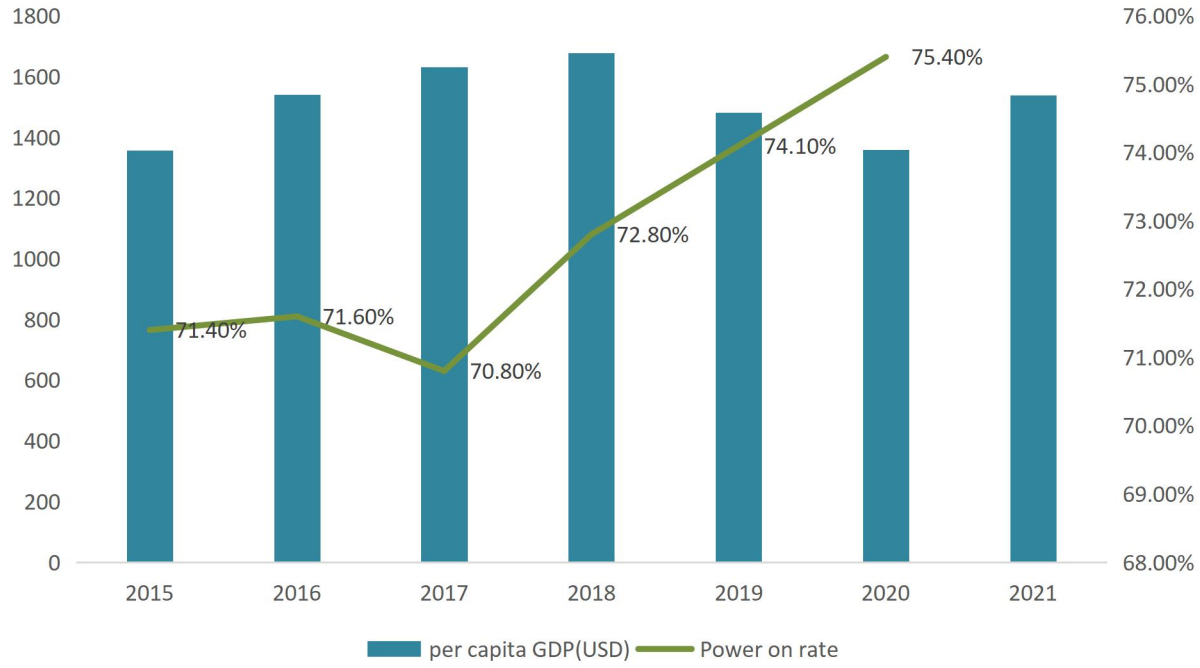
People are increasingly concerned about protecting the ecological environment and the harmonious coexistence between humans and nature, so all countries pay much attention to the sustainability and greenness of development. In recent years, Pakistan has attached great importance to environmental protection and emphasized increasing the share of renewable energy in power and energy development and reducing traditional fossil energy extraction [39].However, most of the current projects in the China-Pakistan power cooperation are coal-fired thermal power projects, and three-quarters of the 17 key energy projects in the China-Pakistan Economic Corridor are thermal power, with an estimated Chinese investment of $8.7 billion [40]. Pakistan's official policy, which has had a definite impact on the country's electricity production, has had a significant impact on primary-stage thermal power projects that have received permits and have not yet started financing, which has caused problems for Chinese power investment companies.

4.China-Pakistan Power Industry Cooperation and Poverty Reduction in Pakistan: A Case Study Based on

The case study approach is suitable for new practices in the exploratory stage. It needs a more comprehensive understanding of existing theoretical and empirical studies due to the transient nature of the subject matter and the unavailability of data [41].Therefore, this paper adopts a multi-case analysis approach by collecting secondary data (mainly official data, research reports, news reports, and literature) to explore how China-Pakistan power cooperation overcame difficulties and positively impacted poverty reduction in Pakistan.

4.1 Improve grid structure and provide reliable power

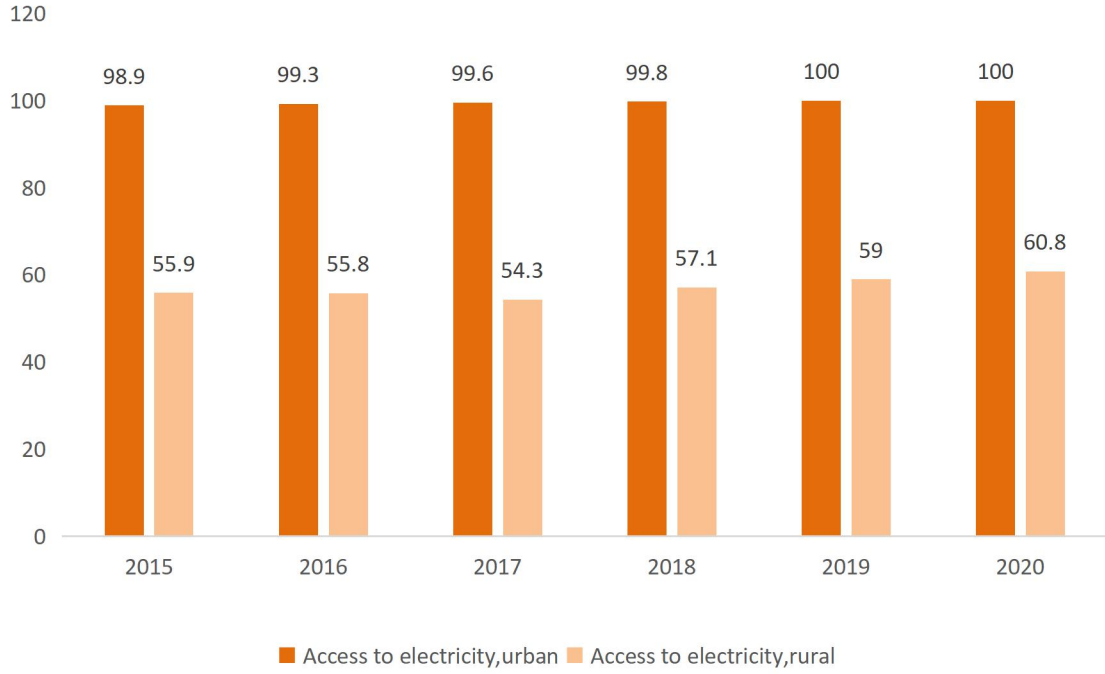
The 886-km-long Murrah DC transmission project, which connects the southern Pakistani city of Mertiari with the northern city of Lahore, is a crucial project of China-Pakistan power cooperation. Before the completion of this project, there were only A.C. power transmission projects in Pakistan with high losses in long-distance and large-capacity transmission [42]. These problems were solved adequately after the Murrah DC project was officially implemented. With the use of D.C. power, the project can account for about one-sixth of the entire Pakistani network, which has relieved the power shortage in Punjab, the most important economic center of Pakistan, and Islamabad, the capital city, and has become the "artery" for the north-south transmission of the country's power grid. At the same time, the project has also solved the electricity problems of about 9.3 million households in Pakistan and provided security for the operation of local enterprises. In an interview, the person in charge of a company said, "In the past, there were frequent power cuts here, which caused serious equipment losses and scrapping of some products, and the company had to use much diesel to generate electricity to maintain production. After accessing power from the Lahore converter station, the duration of power supply has increased, and the company has saved at least 30% of diesel usage, reducing operating costs."[43] Today, nearly 6 million kilowatts of installed capacity has been integrated into Pakistan's national grid under China's power cooperation with Pakistan, the entire national power infrastructure has been further improved and developed, and the energization rate is on an overall upward trend (Fig.4). The power supply's adequacy affects local enterprises' production efficiency and, thus, the country's economic development. China's investment in Pakistan's power shows the world the vast development market of Pakistan. It provides a good power infrastructure for enterprises entering Pakistan, significantly contributing to Pakistan's economic development.



Sources: World Bank（https://data.worldbank.org.cn/country/pakistan）
Fig.4 Growth of GDP per capita and power supply rate in Pakistan
since the launch of China-Pakistan Economic Corridor Project

4.2 Providing jobs and improving people's lives

China-Pakistan power cooperation has improved the electricity conditions of Pakistani people and provided more employment opportunities. For example, after the Lote hydropower plant has been put into entire commercial operation, it can provide 3.2 billion kilowatt hours of clean electricity to Pakistan every year and meet the electricity demand of about 5 million people, which will play an essential role in alleviating the power shortage, improving the energy structure and promoting sustainable economic development in Pakistan[44]. During the construction of Sahiwal Power Station, China proposed to "build a power station, drive a side of the economy, protect a piece of the environment, benefit a side of the people, and build a side of harmony" as the goal, which not only realizes the economic interests of both countries but also greatly protects the ecological environment of Pakistan, so that the project can be carried out smoothly. After the Sahiwal Power Station was put into operation, the annual power generation capacity reached 9 billion kilowatt hours, filling more than 1/4 of the power gap in Pakistan, shortening the blackout time of Pakistan by 2 hours, and solving the electricity problem of 20 million people in the region. While providing sufficient electricity, it has also created many jobs for the people nearby, with 3,000 Pakistani employees participating in the construction project and more than 3,000 families' plight being improved. In addition to the direct jobs created by the construction of power facilities, the increasingly improved infrastructure has also attracted international investors and businesses to Pakistan, easing the pressure on employment [45]. Since the construction of the China-Pakistan Economic Corridor, Pakistan's electricity access rate has increased at an overall growth rate. By 2020, Pakistan has achieved 100% grid coverage in cities and 60% in rural areas (Fig. 5). Electric lights, fans, and telephones are many aspects of life that cannot be achieved without the support of electricity. Adequate electricity supply allows residents to fully enjoy the "dividends" brought by the progress of the electricity industry, which dramatically improves the quality of life and quality of life.



source: World Bank（https://data.worldbank.org.cn/country/pakistan）

Fig.5 Power Connection Rate of Pakistan's Cities and Villages

4.3 Improve the industrial chain and enhance the development momentum

In order to optimize Pakistan's energy extraction structure, reduce Pakistan's dependence on imports, and improve overall national security, China and Pakistan have actively promoted the integration of energy extraction and power generation. In 2015, the construction of China-Pakistan's first coal power integration project, the Thar coalfield coal power project, was officially launched. This project will promote Pakistan's use of domestic resources instead of imported oil and balance of payments while improving Pakistan's mining industry at the overall industry level, improve the industrial chain from energy extraction to power generation, distribution, and consumption, and promote a virtuous cycle, which provides a benchmark for the development of coal power integration in Pakistan (Fig.6).In October 2022, the second phase of the coal power integration project in Pakistan's Thar II block under the framework of the China-Pakistan Economic Corridor was officially launched. Pakistan's Prime Minister Shahbaz Sharif said that the Thar coalfield development and power plant construction had provided Pakistan has saved a lot of foreign exchange expenditure and driven the development of related industries, which is a gift from hard-core brothers [46]. In addition to the Thar coal and power integration project, hydropower integration and gas integration projects are also under construction, which continues to promote the vertical integration of Pakistan's industries and provide feasible solutions for the comprehensive utilization of Pakistan's resources, organizing the sale of products and ensuring the supply of raw materials. Improving the industrial chain positively promotes Pakistan's development momentum, strengthens its comprehensive strength, and improves its international status.

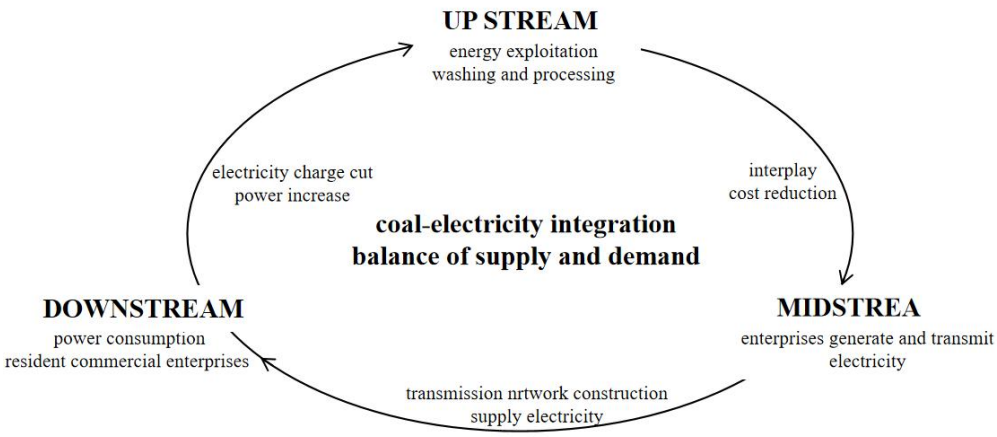


Fig. 6 Pakistan Coal Electricity Integration Industry Chain under China Pakistan Power Cooperation

4.4 Disseminating advanced concepts and cultivating skilled personnel

Driven by the China-Pakistan Economic Corridor, Pakistan's nation-building has ushered in a new period of development opportunities. At the same time, the country's demand for professional and technical personnel has grown significantly. In the process of China-Pakistan power cooperation, many Chinese enterprises are providing professional skills training for the local community without compensation: When the DASU hydropower project of China Energy Construction Gezhouba Group in Pakistan, it attaches great importance to the skills training of Pakistani employees and takes the improvement of the skills level of local employees as one of the critical tasks to promote the localization construction and continuously improve the business' theoretical level and practical operation ability of local employees through on-site teaching by Chinese personnel, skill competitions, and inviting local training institutions. The plan of the Karot hydropower project includes the construction of more than 20 public welfare projects in the surrounding area, including the construction of schools, hospitals, roads, and other public infrastructure. One of the staff working at the plant completed his university studies with the support of the "China Three Gorges-Pakistan Scholarship," established by the Three Gorges Group, and became an electrical engineer at the Karot hydroelectric power plant after graduation [47]. Along the China-Pakistan Economic Corridor, more and more Pakistani residents are receiving education and learning skills with the assistance of Chinese companies, which provides an unprecedented opportunity for local people to escape poverty and enjoy more power. "The advanced experience and technology brought by Chinese enterprises will help the Pakistani people rely on themselves to get rid of poverty fundamentally and also provide a guarantee of highly qualified labor for the future development of Pakistan.

*5.*Suggestions

Pakistan has made great progress in economic development since the China-Pakistan power cooperation[48], which has made an important contribution to poverty reduction in Pakistan. However, there are still some problems in the cooperation between the two countries. Through the above analysis, this paper makes the following policy recommendations on how China and Pakistan can better develop electricity cooperation to promote poverty reduction in Pakistan.

First, improve the cooperation mechanism and make joint efforts to deal with the international situation. In the treacherous international environment, China and Pakistan should maintain cooperative relations and not be confused by conspiracies. To better encourage the development of China-Pakistan power cooperation, China and Pakistan should further sign inter-state power cooperation agreements and memorandums of understanding in the context of the China-Pakistan Economic Cooperation Corridor and formulate more explicit implementation rules to ensure the continuity and effectiveness of the policy. At the same time, the problems of Chinese companies investing in Pakistan power should be effectively solved, the business environment should be optimized, and protection policies should be formulated to protect the interests of both sides.

Second, stabilize the domestic political situation and effectively guarantee the population's security. Economic development is an essential basis for poverty reduction. However, it cannot necessarily lead to universal benefit for the poor, but more importantly, political fairness and equality and political stability is the only guarantee to achieve this goal. A stable domestic environment is a prerequisite for a country's economic development and people's well-being. It is also the basis for long-term electricity cooperation between China and Pakistan. Pakistan should improve the existing system and crack down on terrorist forces. However, due to the influence of history and reality, reform can only be achieved after some time, so the Pakistani government should proceed step by step.

Third, improve the quality of labor and infrastructure construction. Some relevant studies show that education policies are conducive to narrowing the gap in education level, bridging the regional and socio-economic gap, and ultimately helping students from low-income families to upgrade their academic level and lift them out of poverty. Because of this, both countries should cooperate and strengthen the friendly exchange of academic education to produce more excellent technical talents for Pakistan.

Fourth, we should actively engage in dialogue and adhere to sustainable development. China and Pakistan should always bear in mind that green is the color of the "Belt and Road" construction and should be guided by scientific development concepts to jointly promote the "green recovery" of Pakistan's economy, which is the way to a better future and the common expectation of the Chinese and Pakistani people.

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