

Main Risks and Preventive Measures for Investment and Operation in the Brazilian Power Grid Sector

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Abstract

This study examines critical investment risks in Brazil's power grid sector amid deepening China-Brazil energy cooperation. Through analysis, we identify five critical risks: 1) Exchange rate volatility driven by fiscal deficits and commodity dependence; 2) Social instability; 3) Grid vulnerabilities highlighted by nationwide blackouts; 4) Regulatory complexity in labor and environmental compliance; 5) Corruption reflected in suboptimal governance indices. To effectively navigate Brazil's complex business environment, the study further proposes actionable prevention and mitigation strategies tailored to address these multifaceted challenges.

Keywords

Risk Analysis, Brazil, Cross-Border Investment.

1. Background

Both Brazil and China are facing the pattern of reverse distribution of energy bases and electricity loads, and need to develop renewable energy on a large scale and transmit it over long distances. China's experience in the energy and power industry are of great value to the development of Brazil's power industry, and there is a huge potential for cooperation between the two countries in the power industry. However, the business in Brazil will also face a lot of risks. This paper analyzes several major risks that need to be paid great attention to when investing and operating power grid assets in Brazil, and puts forward risk prevention measures.

2. Main Risks

2.1. Exchange Rate Risk

Influenced by the domestic fiscal deficit and international commodity prices, the Brazilian currency real has fluctuated sharply in recent years, maintaining an overall depreciation trend from R\$3.9 per US dollar at the end of 2018 to R\$6.2 per US dollar at the end of 2024. According to the Central Bank of Brazil, the Real's exchange rate depreciated cumulatively by 27% against the US dollar in 2024. Analyzing the fiscal factors and commodity price factors affecting the Brazilian currency, the future trend of the Brazilian currency depends on the effectiveness of domestic fiscal reform and international commodity price trends, still has a large exchange rate risk.

Brazil's fiscal has characteristics of high deficit rate, high debt ratio, high welfare spending. Higher government debt is an important reason for currency depreciation. According to the World Bank's forecast, Brazil's total debt to GDP ratio will rise to about 80% by 2028[1]. In response to the fiscal pressures, the Lula government introduced a fiscal system reform program aimed at strengthening the credibility of fiscal constraints, lowering financing costs, and boosting the level of total investment. However, there may be a high degree of uncertainty as to whether the objectives of the fiscal reform will be accomplished as planned.

The global economic recovery is losing momentum amid heightened uncertainty surrounding the outlook for major economies, which could exert downward pressure on commodity markets. The Brazilian economy, fiscal conditions, and currency exchange rates remain closely tied to commodity market performance. Should commodity prices experience unexpected fluctuations beyond market consensus, this could erode investor confidence in Brazil's capital and currency markets, potentially triggering a depreciation spiral of the real.

2.2. Public Security Risks

In recent years, security problems have continued to be a concern in many parts of Brazil, especially in central cities such as Rio de Janeiro and São Paulo. Crime rates are high near favelas, with frequent robberies and thefts. Violent robberies against Chinese have also occurred from time to time. According to data from the São Paulo State Public Security Secretariat (SSP), over 193,000 thefts were recorded in the city of São Paulo in 2024[2]. The main public security risks in Brazil also caused by local political stability, natural disasters, union organizing campaigns, demonstrations and conflicts.

2.3. Grid Security Risks

In recent years, Brazil's power grid has experienced recurrent collapse incidents, highlighting systemic vulnerabilities in grid structure, generation-load coordination, cybersecurity protocols. At 08:30 Brazilian time on August 15, 2023, Brazil experienced a widespread blackout that affected power supply in 25 states, including the capital city, except for the non-connected state of Roraima, with a loss of load of more than 23000 megawatts[3].

Frequent occurrence of extreme weather threatens stable operation of power grid. In recent years, due to the impact of El Niño climate patterns, power supply repeatedly encountered thunderstorms, temperate cyclones, the number of accidents in the distribution network significantly increased, severely straining emergency response capabilities. Frequent floods in the southern and southeastern parts of the country threaten the safe and stable operation of transmission assets. Grid operators therefore need to allocate more budgets specifically for disaster recovery operations.

2.4. Compliance Risk

Brazil has a very strict labor protection system, which is mainly reflected in the Brazilian Uniform Labor Law and the Federal Constitution, covering various aspects such as minimum wage, working hours, overtime pay, vacations, and compensation for dismissal. In addition, labor unions are strong in Brazil, and labor disputes are usually resolved through union mediation or labor courts. Companies that fail to properly manage labor relations may face high compensation and administrative penalties. Labor unions often organize strikes and demonstrations to express dissatisfaction with policies or employer actions, such as in 2017 when a mass strike broke out in Brazil to protest labor law and pension system reforms. In recent years, Brazil has also strengthened regulations on gender equality, mental health, and workplace safety, requiring employers to publish pay transparency reports and ensure the mental health of employees. Brazilian labor laws are biased toward protecting workers, and employers are required to comply with strict labor regulations or risk facing strikes and legal lawsuits. On December 23, 2024, Brazil's Ministry of Public Labor issued a statement saying it rescued 163 workers and closed BYD's construction site in the Kamakali city[4], which underscored the importance of labor compliance management.

Brazil's environmental regulatory framework is characterized by multi-layered legal requirements and stringent enforcement mechanisms, posing significant operational compliance risks for businesses operating within the country. Brazil has a comprehensive legal framework centered on its Constitution, supported by sector-specific laws covering forests, water resources, pollution control, etc. Brazil was the first country in the world to include

environmental protection in its constitution, which explicitly states that “all people have the right to an ecologically balanced environment”. This constitutional mandate is operationalized through legislation including the National Environmental Policy Law, National Solid Waste Policy, and National Climate Change Policy. Brazil has a very strict Environmental Impact Assessment (EIA) system that requires all projects that may have a significant impact on the environment to obtain an environmental license prior to construction and operation. Failure to comply with environmental requirements may result in financial sanctions, project suspension, criminal prosecution and other penalties.

2.5. Corruption Risk

The World Bank publishes the Governance Indicators every year[4], and the World Economic Forum publishes the Global Competitiveness Report every year [5], which evaluates the corruption situation in each country. From the evaluation results in recent years, Brazil's domestic integrity level is lower than that of developed countries, and is equivalent to the average of emerging countries.

Low administrative efficiency of the Government could lead to incentives for businesses to pay bribes to speed up administrative processes and reduce time costs. Brazil has launched a series of anti-corruption actions in recent years, although some achievements have been made, but still need to pay attention to the fact that Brazil's political corruption problem has existed for a long time, behind which there is a deep social and political background. On the one hand, Brazilian society has long existed a complex system of “unspoken rules”, and laws and institutions have long been in a state of ineffective implementation. On the other hand, Brazil's political bureaucracy is prevalent, and the multi-party system brings electoral competition and political contributions. As a result, Brazilian anti-corruption departments are unable to play a good role in restricting and regulating corrupt behaviors institutionally. Therefore, in the short term, the situation of frequent and easy occurrence of corruption in Brazil will be maintained, and businesses will continue to face corruption risks. Only by strictly adhering to ethical principles, upholding core values, and rigorously complying with local legal frameworks can enterprises ensure the sustainable development of their business in Brazil.

3. Risk Prevention Measures

3.1. Regarding Exchange Rate Risks

To effectively manage foreign exchange risks, enterprises should adopt a comprehensive strategy that integrates financial hedging instruments (such as currency forwards or options) to mitigate currency fluctuations, establish systematic processes for repatriating dividends from overseas projects, prioritize the repayment of foreign currency-denominated debt in international operations, and ultimately reduce net foreign exchange exposure to enhance financial stability in global markets.

3.2. Regarding Public Security Risks

To systematically manage overseas personnel safety risks, enterprises should implement routine monitoring controls, conduct in-depth analysis of country-specific security dynamics, leverage multilateral security partnerships, and establish a continuous improvement framework by regularly evaluating and dynamically updating risk mitigation protocols, emergency plans, and scheduled training drills to ensure operational resilience.

3.3. Regarding Grid Security Risks

To ensure the operational integrity of Brazil's power infrastructure, a comprehensive risk assessment must be conducted to systematically identify and address grid safety vulnerabilities, strengthen preventive safeguards, and institutionalize dynamic risk management protocols for

overseas grid projects. This entails integrating the expertise of local entities to optimize governance frameworks for cross-border subsidiaries, implement standardized protocols for resolving critical technical challenges and emergency failures, and enforce rigorous maintenance of core transmission assets alongside enhanced on-site safety supervision. Concurrently, bilateral technical forums should be established to foster collaborative innovation in grid resilience, driving multilateral cooperation in power security and operational best practices.

3.4. Regarding Compliance Risks

To ensure robust compliance in global operations, enterprises must rigorously adhere to international trade norms and Brazilian regulatory frameworks, institutionalize mandatory legal reviews for all "Three Important and One Major" initiatives (encompassing strategic decisions, executive appointments, capital-intensive projects, and high-value fund allocations), and establish a systematic mechanism for continuous identification, assessment, and mitigation of legal risks across overseas business activities to safeguard operational integrity and sustainable compliance.

3.5. Regarding Integrity Risks

To embed cross-border anti-corruption governance into the core framework of overseas operations, organizations should implement systematic compliance protocols, launch targeted interventions in high-risk sectors through forensic audits and enhanced oversight mechanisms, and enforce stringent accountability by rigorously investigating and sanctioning violations of legal, regulatory, and disciplinary breaches to uphold ethical integrity and mitigate systemic risks.

4. Conclusion

Brazil's power grid sector presents strategic opportunities for China-Brazil cooperation yet entails multifaceted risks requiring calibrated management. Macroeconomic exposure necessitates proactive foreign exchange hedging and debt structuring, contingent on monitoring fiscal reforms and commodity cycles. Public security threats demand investment in localized risk intelligence and multilateral crisis response mechanisms. Grid resilience must integrate climate adaptation and cybersecurity upgrades, supported by bilateral technical exchanges. Compliance risks require institutionalizing Brazilian labor standards and environmental licensing within operational frameworks, avoiding costly litigation. Corruption mitigation hinges on ethical institutionalization beyond legal minimums, particularly in high-interaction government interfaces.

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