Leadership & Democracy Lab

Political Risk Assessment

Brazil's Energy: Risks & Mitigation Strategies

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Executive Summary

Brazil is well positioned to be a global leader in the production and export of renewable energy. However, the state's poor economic position, unstable domestic government and poor infrastructure are largely withholding the government from investing in its potential. This addresses and mitigate the risks associated with renewable energy in Brazil.

First, the report focuses on the economic risks associated with foreign investment in Brazil's renewable energy sectors. This section outlines political risks caused by Brazil's high public debt and the privatization of its largest energy company, Petrobras. Following discussions of environmental risks, the report analyzes uncertainties caused by domestic politics in Brazil. This section addresses how domestic power transitions, political corruption, and violence and polarization in Brazil politics impacts the state's ability to implement renewable energy policy.

Finally, the report addresses a plethora of political risks associated with social and environmental issues. This section argues that before Brazil can seek to implement lasting renewable energy systems, the state must first direct resources towards fixing transportation and critical infrastructure. In addition, this section addresses the environmental risks associated with the creation and furtherment of renewable energy infrastructure for Brazil and the surrounding region.

Economic Risks

Brazil's emerging renewable energy sector presents a foreign investment opportunity with several associated economic risks[1].Economic risk refers to the likelihood that an investment will be economically unsustainable due to macroeconomic influences such as exchange rates or political instability[2]. This section focusses on economic risks associated with foreign investment in Brazil's renewable energy sectors and explain the implicated political risk for Brazil and surrounding regions in South America. Specifically, the political risks posed by high public debt and the privatization of Brazil's largest energy company.

High Public Debt

High public debt in Brazil is a risk as it limits national spending capacity for renewable energy, and delays in addressing this debt may deter foreign investors. Brazil's economy is vulnerable from the effects of Brazil's economic crisis in 2014, followed by the recession of the 2020 pandemic.[3] The high levels of public debt inherited by Lula's administration will influence Brazil's economic policy on renewable energy, presenting a risk to investors in this sector.[4] Brazil's current debt-to-GDP ratio is nearly 90 per cent, limiting its capacity to invest in its future for renewable energy.[5] Further, inflation and interest rates are expected to rise in 2023, reducing investor confidence in the short-term despite inflation predicted to ease in 2024.[6] Further, this risk is exacerbated by the impacts of the January 8 capital riots, which include concerns of political instability and a depreciation of the Brazilian Real.[7] Although the government minimized losses in the market through quick intervention, previous instances of major political unrest in Brazil, such as protests fueled by former President Jair Bolsonaro in September of 2021, have led to major losses in both assets and currency.[8] Such uncertainties alone pose sufficient risk to deter investors and reduce the government's capacity to finance necessary renewables projects. The riots may also reduce pressure on Lula to produce an economic plan.[9] This raises the risk of decreasing investor confidence and prolonging inefficient energy grids at a time of much needed growth. This cumulation of macroeconomic concerns reduces the likelihood that economic reforms needed to foster sustainable investment in renewable energy, such as simplifying the complex tax system, addressing inefficiencies in the energy system and infrastructure investments, will be prioritized.

Delaying the implementation of economic reforms prevents economic growth to bridge the gap between Brazil's 'emerging' potential and the concrete benefits for the entire country, not just investors. Brazil's gas prices are higher than those of its global peers despite having a greater abundance of natural resources and a growing capacity for renewable energy generation.[10] For instance, Brazil and Canada both rely on hydropower, which is among the cheapest energy sources. Despite Brazil's rich water resources and generational capacity, its electricity rates are 35 per cent higher than Canada's.[11] Brazil's large energy consumers association (ABRACE) finds that for every 10 reais paid on an electricity bill, consumers must pay an additional 30 reais to cover the so-called political costs of energy, including taxes, fees and subsidies.[12]

1 "Economic Risk," in *IFRS Financial Reporting and Analysis Software,* June 2014, https://www.readyratios.com/reference/analysis/economic_risk.html.
2 Marcio Holland, "Fiscal crisis in Brazil: causes and remedy," *Brazilian Journal of Political Economy* 39, no. 1 (2019): 88, https://doi.org/10.1590/0101-35172019-2918.
3 United States, Dept. of State, Bureau of Economic and Business Affairs, *2022 Investment Climate Statements: Brazil* (Washington DC: Bureau of Economic and Business Affairs, 2022) https://www.state.gov/reports/2022-investment-climate-statements/brazil/
4 Alexander Kozul-Wright, "Brazil's third-time president Lula has new economic problems," in *Al Jazeera*, January 1, 2023, https://www.aljazeera.com/economy/2023/1/1/brazils-third-time-president-lula-has-new-economic-problems.
5 The World Bank, *The World Bank in Brazil*, October 7, 2022, https://www.worldbank.org/en/country/brazil/overview#1.
6 Luana Maria Benedito, Paula Arend Laier and Gabriel Araujo, "Brazil's currency, stock futures down after Bolsonaro supporters storm capital," in *Reuters*, January 9, 2023, https://www.reuters.com/markets/brazils-currency-stock-futures-down-after-bolsonaro-supporters-storm-capital-2023-01-09/
7 Susan Mathew and Shreyashi Sanyal, "Brazilian Currency Trims Losses After Initial Shock From Capital Riots," in *Reuters*, January 9, 2023, https://money.usnews.com/investing/news/articles/2023-01-09/brazil-markets-fall-as-bolsonaro-supporters-storm-capital.
8 Susan Mathew and Shreyashi Sanyal, "Brazilian Currency Trims Losses After Initial Shock From Capital Riots," in *Reuters*, January 9, 2023, https://money.usnews.com/investing/news/articles/2023-01-09/brazil-markets-fall-as-bolsonaro-supporters-storm-capital.
9 Marcelo Aude, Guillaume Decaix, Kevin Nobels, and Juliana Pinto, "How Brazil can optimize its cost of energy," in *McKinsey & Company*, March 10, 2021, https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/how-brazil-can-optimize-its-cost-of-energy
10 Aude et al, *How Brazil can optimize its cost of energy.*
11 Bnamericas, "Why Brazil's power bills look set to rise," May 3, 2022, accessed January 21, 2023, https://www.bnamericas.com/en/analysis/why-brazils-power-bills-look-set-to-rise.
12 Aude et al, *How Brazil can optimize its cost of energy.*

Further, inefficiency in the energy grid results in waste, which consumers pay for.[13]This affects the productivity and spending power of Brazilian workers who pay disproportionate amounts of their income on energy, particularly those in remote areas with low incomes. High public debt prevents prioritizing energy reform while elevated interest rates weaken private demand and investment, leading to estimations that Brazil's GDP growth will slow in 2023. [14] As a result, delaying the implementation of an economic reform agenda will further dissuade potential investors from Brazil's renewable energy market.

Mitigation Strategy

There are several strategies to mitigate the economic risks posed by high public debt in Brazil. First, targeting the inefficiencies in Brazil's energy grid as a priority in economic policy would help to mitigate sinking investor confidence and stimulate economic growth beyond power markets. A study by ABRACE found that achieving a competitive price for electricity could raise Brazil's expected annual economic growth over the next ten years from 1.7 to 4.8 per cent and generate 6.74 million jobs.[15] Further, reducing electricity prices can improve efficiency beyond the power market.[16] For instance, energy-intensive industries such as mining can become more competitive as costs decrease, and the electrification of industrial processes in factories can be expedited.[17] This may increase political support for the renewable energy transition while providing a more stable investment environment. Reducing electricity prices can be accomplished by diversifying and optimizing the energy system, reducing grid loss by striving to achieve international benchmarks, and supporting incentives to accelerate energy efficiency.[18] Second, the risks associated with low investor confidence in financing energy diversification could be mitigated by placing an initial focus on hydropower, as investors can refer to quantifiable growth outcomes from past investment in this area.[19] Hydropower investment has shown to produce growth when paired with electrification policies in Brazil.[20] These investments yield greater productivity and reduce fixed operating cost by limiting reliance on supporting equipment and incentivizing technological progress with tools such as electric irrigation pumps.[21] Achieving reliable returns on hydropower electrification may increase investor confidence in diversifying to renewable energy sources with more gradual benefits. For instance, wind farms currently have the lowest levelized cost of energy, while solar power is predicted to achieve an even lower cost in up to four years.[22] Strengthening Brazil's position as a leader in renewable energy in South America would produce benefits in economic development across Brazil and the broader region. For example, the use of renewable energy minimizes reliance on imported fuels, creates skilled and unskilled job opportunities, and facilitates growth in underdeveloped industries.[23] Brazil is the eighth-largest electricity producer in the world with a geographic advantage due to its abundance of diversified natural resources and high renewable energy production capacity of 81.7 per cent compared to the global average of 23 per cent.[24] Consequently, addressing high public debt and inefficiencies associated with investment in the renewable energy sector is crucial to taking advantage of Brazil's resources and dispensing these benefits across the region.

Risk 2: Eletrobras Privatization

The privatization of Eletrobras poses a risk as it reduces the ability of the government to direct Brazil's long-term renewable energy strategy. Eletrobras is Brazil's largest power and generation company,

[13] Fitch Solutions, *Brazilian Growth Headed for a Slowdown in 2023*, January 27, 2023, https://www.fitchsolutions.com/country-risk/brazilian-growth-headed-slowdown-2023-27-01-2023.

[14] Mark Langevin, "What Do Privatization Efforts in the Energy Sector Mean for Brazil?" The Dialogue: Leadership for the Americas (blog), July 25, 2022, https://www.thedialogue.org/blogs/2022/07/what-do-privatization-efforts-in-the-energy-sector-mean-for-brazil/, accessed January 16, 2023.

[15] Aude et al, *How Brazil can optimize its cost of energy*

[16] Ibid,.

[17] Ibid,.

[18] Ibid,.

[19] Fidel Perez-Sebastian, Jevgenijs Steinbuks, Jose Feres and Ian Trotter, "Electricity Access and Structural Transformation: Evidence from Brazil's Electrification," *World Bank Group Policy Research Working Paper*, March 13, 2020, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/728811584105259025/electricity-access-and-structural-transformation-evidence-from-brazils-electrification

[20] Perez-Sebastian et al, *Electricity Access and Structural Transformation*.

[21] Ibid,.

[22] Aude et al, *How Brazil can optimize its cost of energy.*

[23] Cosimo Magazzino, Marco Mele and Giovanna Morelli, "The Relationship between Renewable Energy and Economic Growth in a Time of Covid-19: A Machine Learning Experiment on the Brazilian Economy," *Sustainability* 13, no. 3 (2021), 8, https://doi.org/10.3390/su13031285.

[24] Mark Langevin, "What Do Privatization Efforts in the Energy Sector Mean for Brazil?" The Dialogue: Leadership for the Americas (blog), July 25, 2022, https://www.thedialogue.org/blogs/2022/07/what-do-privatization-efforts-in-the-energy-sector-mean-for-brazil/, accessed January 16, 2023.

serving over 44 million individuals and generating nearly 30 per cent of Brazil's electric supply.[25] Its recent privatization during Bolsonaro's administration was the product of years of negotiations, resulting in the dilution of the state's 72 per cent voting rights to 45 per cent.[26] This is significant to Brazil's long-term economic development because it remains an emerging economy with the resources to realize its potential, but is held back by slow growth and a lack of policy reform momentum.[27] A strong commitment to a green economy would foster investment, develop sustainable infrastructure and contribute to local productivity. The loss of the government's voting power in Eletrobras minimizes the opportunity to leverage this long-term strategy to provide Brazil with the guidance to emerge as a leader in the energy transition.

Privatizing energy infrastructure includes risks that the quality of service will deteriorate for customers. This was demonstrated by the 18-day blackout in Brazil's northern state of Amapa in 2020.[28] 90 per cent of residents were affected when private Spanish company Isolux won a private contract to maintain the state's energy substation but failed to address power cuts.[29] In this case, the government had little control to mitigate the the crisis for which control rested with foreign management, illustrating a source of concern over Eletrobras becoming controlled by foreign investors. This event highlights a risk factor regarding Brazil's ability to drive its long-term renewable strategy without the power to direct operations. The difference between the stock offer and estimates of fair market value indicate that the tender was rushed.[30] Additionally, the concession to several conditions suggests that privatization will prioritize short-term profits over strengthening the energy sector and advancing Brazil's renewable energy strategy.[31] For instance, a gas-to-power mandate was included which requires that 2.5GW of gas power capacity be constructed to mitigate any volatility in renewable sources.[32] However, it diverts funds from diversifying the renewable grid which would also mitigate volatility. These conditions make it more likely that Eletrobras will prioritize higher-earning, short-term opportunities to raise profits and deliver returns rather than the lower-earning, longer-term investments characteristic of the renewable energy transition.[33] Ultimately, this may hinder Brazil's efforts to lead the energy transition and acquire sustainable investment in this sector, despite the country being well positioned to do so.

Mitigation Strategy

There are several strategies to mitigate the risk posed to Brazil's long-term renewable energy investment strategy through the privatization of Eletrobras. First, the privatization agreement precludes any single group from controlling the company through a 10 per cent voter ceiling on individual stakes in the company.[34] This is reinforced by provisions which would force any shareholder, including the government, to pay a 200 per cent premium if seeking to exceed this limit.[35] The government further maintains a "golden share", meaning it may veto resolutions to alter this limitation. Although these stipulations would make the re-nationalization of the company cost three times its current value, it also prevents any single foreign investor from gaining control of a company responsible for 30 per cent of the country's electricity, therefore acting as a safeguard against disasters such as with Isolux in Amapa.[36] This is also acts as safeguard for Brazil's control over its renewable energy strategy and upholds the possibility that Lula's government can influence deliberations.[37] Additionally, it prevents some of the negative impacts

[25] Langevin, *What Do Privatization Efforts in the Energy Sector Mean for Brazil?*
[26] The World Bank, *The World Bank in Brazil*.
[27] Bnamericas, "Who's to blame for Amapá's energy crisis?" November 18, 2020, accessed January 20, 2023, https://www.bnamericas.com/en/analysis/whos-to-blame-for-amapas-energy-crisis.
[28] Bnamericas, *Who's to blame for Amapá's energy crisis?*
[29] Langevin, *What Do Privatization Efforts in the Energy Sector Mean for Brazil?*

[30] Rebecca Compertz, "Brazil power keeps the gas line tab with customers," Argus (blog), December 12, 2022, accessed January 21, 2023, https://www.argusmedia.com/en/news/2399932-brazil-power-bill-keeps-gas-line-tab-with-customers.
[31] Langevin, *What Do Privatization Efforts in the Energy Sector Mean for Brazil?*

[32] Baker McKenzie, "Brazil: Eletrobras' Privatization Act is Enacted with Veteos," July 15, 2021, accessed January 17, 2023, https://insightplus.bakermckenzie.com/bm/projects/brazil-eletrobras-privatization-act-is-enacted-with-vetoes.
[33] Michael Pooler, "Eletrobras plays down risk of renationalisation under new Brazilian government," in *Financial Times*, December 28, 2022, https://www.ft.com/content/c43ff627-51e3-476a-9c07-2338c3e48fef.
[34] Pooler, *Eletrobras plays down risk of renationalisation under new Brazilian government.*
[35] Baker McKenzie, *Brazil: Eletrobras' Privatization Act is Enacted with Veteos.*
[36] Kristalina Georgieva and Tobias Adrian, "Public Sector Must Play Major Role in Catalyzing Private Climate Finance," IMF Blog (blog), International Monetary Fund, August 18, 2022, https://www.imf.org/en/Blogs/Articles/2022/08/18/public-sector-must-play-major-role-in-catalyzing-private-climate-finance, accessed January 19, 2023.
[37] Canadian Solar, *Canadian Solar Secures 136 Million Brazillian Reais Financing for Lavras II Project in Brazil*, June 15, 2022, https://investors.canadiansolar.com/news-releases/news-release-details/canadian-solar-secures-136-million-brazilian-reais-financing.

associated with foreign direct investment, in which the investor takes on a controlling role, such as hiring very few local skilled workers and contributing minimally to the local economy. Accordingly, the government should attempt to leverage its remaining 45 per cent stake and ownership over certain subsidiaries to direct investments toward the renewables strategy to the greatest extent possible.[38] Second, the government can use policy to help incentivize renewable investment to counteract the likelihood that investors will favour traditional energy sources with known returns. For instance, implementing strong and consistent carbon pricing can contribute to market transparency and incentivize investors. Further, the government could signal its leadership in the energy transition by publishing high-quality, reliable data and establishing climate disclosure standards. Finally, the government could build on its recent investment from Canadian Solar in Brazil's Lavras II solar power project to attract foreign investment from countries such as Canada with an existing investor relationship and an aligned vision on renewable energy.[39] For instance, Canada shares Brazil's use of hydroelectricity and long-distance transmission lines. Brazil could highlight such synergies in addition to its rich and diversified resources to attract further investment from Canada, who may otherwise rely more heavily on the closer U.S. market.

[38] Government of Canada, "Spotlight from the Field: The TCS in Sao Paulo," in Government of Canada, Trade Commissioner Service, April 22, 2022, https://www.tradecommissioner.gc.ca/canadexport/0006799.aspx?lang=eng.

[39] Canadian Solar, *Canadian Solar Secures 136 Million Brazillian Reais Financing for Lavras II Project in Brazil*, June 15, 2022, https://investors.canadiansolar.com/news-releases/news-release-details/canadian-solar-secures-136-million-brazilian-reais-financing.

Domestic Political Risks & Mitigations

Jair Bolsonaro's presidency in Brazil was perceived as negative for the country's renewable energy industry. The election of Luiz Inácio Lula da Silva in October 2022 was viewed by many as a step in the right direction for climate and clean energy policies in Brazil. After taking office, on January 1st 2023, Lula pledged to reverse the negative climate policies that were instituted under Bolsonaro[40]. Experts have predicted that under Lula, Petrobras, Brazil's state-owned energy company, will continue its oil and refining projects and additional funding will be provided expanding the company's involvement in the renewables sector.[41]

However, events like the January 8th attacks, have demonstrated the risks that the renewable energy industry must contend with. Power transitions, mass corruption, and political violence and polarization are key political risks to the renewables industry in Brazil, and the following sections will outline these risks and provide mitigating strategies.

Transfer of Political Power

Instability in Brazil's political process is a key risk. Given the long construction time, and significant financial and time costs of renewable projects, their timelines often outlast Presidential terms. [42] In Brazil, terms last four years with the possibility of re-election for one consecutive term.[43] Brazil's current political climate there are two major ways that domestic politics could contribute to transition risks. First is the development of uncertainty around the result. Following his loss in the 2022 election, Bolsonaro asserted false claims that the election results were incorrect.[44] A portion of the population supports this narrative and refuses to accept Lula as president. This creates a dangerous situation where the transition of power is not fully achieved. Recently, this has manifested itself in the January 8th, 2023 attacks which had prominent sectors of the public calling for a military coup to overthrow Lula. If a successful coup did occur, the incoming president would be able to reverse any progressive renewable policies that Lula had implemented. For example, Lula has promised to achieve zero deforestation in the Amazon and 100% renewable energy reliance.[45] In addition, if Lula remains in power, his attention may be pulled away from the renewables industry while attempting to manage the instability among the public, thus progressing the industry less than expected. Second, there is a stark contrast between Bolsonaro's and Lula's energy policies. As a result, energy projects can be significantly influenced by the sitting presidents' policies. Lula is viewed as having far more positive policies towards renewables, while many saw Bolsonaro's policies falling short of Brazil's potential for clean energy.[46] Therefore, with more instability through coups or uncertain results, the renewables industry may receive less government support.

Corruption

Corruption poses a significant risk as it leads to mismanagement of funds, and a less reliable management process. Since 2013, Brazil has faced corruption within its political elite in both the ruling Workers Party (PT), led by Lula and in 2017 under Bolsonaro's Liberal Party.[47] The corruption among the political elites of Brazil is also a risk to the majority state-owned renewables industry. Due to the government's majority ownership of Petrobras they have a significant influence in selecting its senior leadership. Corrupt hiring practices exist, and candidates are often selected based on favoritism or

40 Karl Mathiesen, "Brazil's Lula Returns with Amazon Dream Team Aiming to Save the Rainforest," Politico, January 1, 2023, https://www.politico.eu/article/luiz-inacio-lula-da-silva-amazon-team-save-rainforest/.
41 Vereen, MK, and Daniela Stevens. "Brazilian Energy Policy under Lula: What to Expect." The Dialogue, November 15, 2022. https://www.thedialogue.org/analysis/brazilian-energy-policy-under-lula-what-to-expect/.
42 "What to Expect of Lula's Administration in Brazil's Energy Sector," (BNamericas, November 4, 2022), https://www.bnamericas.com/en/features/what-to-expect-of-lulas-administration-in-brazils-energy-sector.
43 "Brazil's Parliament and Other Political Institutions: Think Tank: European Parliament," Think Tank | European Parliament, January 14, 2021, https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)659447.
44 Adriano Machado, "Bolsonaro Backers Ransack Brazil Presidential Palace, Congress, Supreme Court," Reuters, January 9, 2023, https://www.reuters.com/world/americas/bolsonaro-supporters-invade-congress-presidential-palace-brasilia-2023-01-08/.
45 Sebastian Rodriguez, "Lula Revives $1 Billion Amazon Fund and Environmental Protections," Climate Home News (Climate Home, January 4, 2023), https://www.climatechangenews.com/2023/01/04/first-day-office-lula-revives-1-billion-fund-amazon/.
46 Jake Spring, "Analysis: Brazil's Green New Deal: Lula Promises Environmental Policy Overhaul," Reuters, October 27, 2022, https://www.reuters.com/world/americas/brazils-green-new-deal-lula-promises-environmental-policy-overhaul-2022-10-27/.
47 Oliver Stuenkel, "Brazil's Polarization and Democratic Risks ," Carnegie Endowment for International Peace, February 17, 2021, https://carnegieendowment.org/2021/02/17/brazil-s-polarization-and-democratic-risks-pub-83783. pg. 8

political ties, rather than merit. This leads to executives and decision makers who are not adequately experienced or adept to run the company. Additionally, corrupt hiring practices allow the government to place people who they hold influence over into positions of power, thus extending their role into the company, and increasing potential political interference in business decisions.

Mitigating the risks that come with corrupt hiring practices should begin transparency mechanisms[48] This theory has since been replicated in studies by political scientists, who have found a negative correlation between corruption and transparency, proving that these mechanisms are an effective tool in reducing corruption levels.[49] Mechanisms may include ensuring that accurate and timely reports are published, outline the company's handlings and financial decisions, ensuring citizens' access to information through freedom of information laws, mandatory disclosure laws, or contract transparency.[50] Allowing for more transparency in company decisions and the election of new executives ensures that the public has the ability to hold the company accountable for following proper procedures.

Political Polarization

Mass polarization and political violence inflame instability, and reduce the priority focus on issues like renewable energy and the environment. The polarization of the Brazilian public is not a new phenomenon, but has been growing since the 2013 protests sparked by skepticism of government corruption. Polarization does not always indicate political violence, but recent events have demonstrated that there are sectors of the population who are willing to resort to political violence. The aftermath of the January 8th attacks indicates this. Additionally, there is concern regarding the loyalty of the armed forces and police in Brazil. There is growing suspicion that parts of the police did not try to stop the attackers on January 8th. Moreover, studies conducted by the Brazilian Public Forum in 2021 showed that 38% of police officers interacted in pro-Bolsonaro forums online, and 21% were involved in radical groups in which overthrowing the election was discussed.[51] In addition to detracting leaders' attention from other issues, such as renewables, polarization has the potential to create unrest at companies and among employees. If unrest is substantial it could lead to insider risks at companies, where disgruntled employees take their anger at the government out through sabotaging projects.

Political polarization is not an issue unique to Brazil, many countries are grappling with the risks that arise from a polarized public. Mitigating these risks is a long-term process requiring work done over years to renew the public's trust in the government. Some strategies to increase public trust is creating awareness programs that are aimed at creating a non-partisan knowledge and information sharing space. This allows people to seek accurate and reliable sources, free partisan bias. Building these sources requires work with local non-profits and community organizations who already have a space and are trusted in communities. As these courses become more common it can help to improve public trust, thus reducing the chances of political violence.

Renewable energy development in Brazil presents an opportunity for social and environmental advancement for those living in the country. However, before Brazil can effectively implement renewable energy reforms, the country must first address a plethora of social and environmental issues deterring the potential benefits of renewable infrastructure projects. Specifically, the issues discussed in this section are a lack of critical and urban infrastructure, weak transportation systems, and potential environmental risks associated with renewable energy development.

Urban Development

Not all of Brazil's infrastructure developments are focused on rural areas of the country. Efforts are

48 Seumas Miller, "Corruption," Stanford Encyclopedia of Philosophy (Stanford University, September 21, 2018), https://plato.stanford.edu/entries/corruption/.

49 Can Chen and Sukumar Ganapati, "Do Transparency Mechanisms Reduce Government Corruption? A Meta-Analysis," *International Review of Administrative Sciences*, August 31, 2021, https://doi.org/10.1177/00208523211033236.

50 "Transparency Mechanisms and Movements, "(Natural Resources Governance Institute), accessed February 22, 2023, https://resourcegovernance.org/sites/default/files/nrgi_Transparency-Mechanisms.pdf. pg. 3

51 Vasco Cotovio et al., "Brazil Security Failings on January 8 Draw Growing Scrutiny," CNN (Cable News Network, January 17, 2023), https://www.cnn.com/2023/01/17/americas/brazil-police-bolsonaro-congress-attack-intl-latam.

also being made to increase the development of urban centers, which would lead to a higher standard of living and a reduction in inequality.[52] Urban development in Brazil during the 20th century was very disorganized. The urban population percentage doubled from 44% to 85% as the country industrialized during the second half of the 20th century. However, urban infrastructure lagged behind population growth.[53] Since the implementation of Brazil's City Statute at the beginning of the 21st century, various urban development projects have been undertaken by the Brazilian government with marked improvements to urban planning and development.[54] Currently, Brazil's leading urban development project is the National Urban Development Policy (PNDU), created in 2019.[55] The objective of the PNDU is in line with the rest of Brazil's infrastructure development goals which include addressing socioeconomic disparities and working towards the United Nations' Sustainable Development Goals. The UN SDGs cover issues such as improving sanitation, accessing clean water, providing avenues for economic growth, and promoting sustainability.[56] Brazil's recent development projects have emphasized using resources and structures already available to upgrade cities instead of creating new ones. An emphasis is also placed on increasing the use of renewable energy resources in large urban centres in lieu of fossil fuels. As a result, uninhabited buildings are being utilized over expanding outwards, urban management processes are being upgraded, and more energy transport lines are being routed to the cities. urban bureaucracies are being streamlined.[57] Another critical aspect of Brazil's urban revitalization project is the incorporation of democratic participation. Municipalities are prioritizing the needs of the local population in urban development projects as each city has differing priorities based on the local population. Popular participation is achieved by elected representatives, popular referendums, and local campaigning.[58]

However, caution should be taken when surveying the community as those most vulnerable may have restricted access to engaging with city authorities. People who work in precarious workplace environments will have less time to contribute to urban planning than white-collar workers. As members of the public are elected, there is a higher chance that marginalized gender and racial groups will not be adequately represented, reducing their influence on city development. Steps should be taken to ensure that groups often sidelined have a proportional influence. Steps should also be taken to ensure that the entire community understands the discussed policies. This can be accomplished by providing city master plans in various languages and formats to increase accessibility.

[52] Guimarães, Ana. "Community participation: how the population contributes to urban planning and cities' development in Brazil and Portugal." Terr@ Plural 13, no. 3 (2019): 388-409.s
[53] Guimarães, Ana. "Community participation: how the population contributes to urban planning and cities' development in Brazil and Portugal." Terr@ Plural 13, no. 3 (2019): 388-409.
[54] "The Future of the Brazilian City Statute," Cities without slums (Cities Alliance, July 21, 2021), https://www.citiesalliance.org/newsroom/news/urban-news/future-brazilian-city-statute.
[55] "National Progress Report on Implementing the New Urban Agenda," Urban Agenda Platform (Ministry of Regional Development, 2021), https://www.urbanagendaplatform.org/.
[56] National Progress Report on Implementing the New Urban Agenda," Urban Agenda Platform (Ministry of Regional Development, 2021), https://www.urbanagendaplatform.org/.
[57] National Progress Report on Implementing the New Urban Agenda," Urban Agenda Platform (Ministry of Regional Development, 2021), https://www.urbanagendaplatform.org/.
[58] Guimarães, Ana. "Community participation: how the population contributes to urban planning and cities' development in Brazil and Portugal." Terr@ Plural 13, no. 3 (2019): 388-409.

Other Political Risks

Transport Risks

Brazil is the fifth largest countries in the world, covering 8.5 million square kilometers of grasslands, rivers, jungles, and mountain regions and is home to two-thirds of the world's ecologically vital amazon rainforest.[59] The physical vastness of Brazil necessitates expansive infrastructure projects, including those of transportation, energy, and urban development. In addition, Brazil's diverse ecosystems produces an abundance of resources that Brazil transports domestically and exports internationally. A majority of Brazil's domestic resources, including minerals such as iron and manganese, are extracted and processed in the southern regions of Brazil, near cities such as Sao Paulo and Rio de Janeiro, then transported north to places such as the national capital of Brazil and trading hubs including Salvador.[60] The reliance on the transportation of goods across the country has resulted in the construction of a national road network over the past few decades. Currently, Brazil's road networks transport an estimated 60% of Brazil's total cargo.[61] While Brazil's road networks are expansive, the infrastructure is of low quality. Only 12% of the roads in the country are paved, and many of the paved roads have not been recently updated or repaired. Through a recent 56-billion-dollar investment from the Brazilian government, along with foreign investments, efforts are being made to expand the preexisting road network as well as revitalize the railway system to lower transportation costs, increase efficiency, and decrease carbon emissions[62].

To mitigate risks associated with Brazil's poor transportation infrastructure, the country has launched a public-private partnership that has approved thousands of kilometers of railway construction projects.[63] However, some of these projects, including Ferragamo and Ferrovia Norte-Sul, are controversial as they are planned to cut through the Amazon rainforest.[64] Constructing rail through the Amazon would increase deforestation and disrupt local indigenous groups and wildlife in the Amazon region. Also, the ability of rail networks to transport goods such as soybeans and corn quicker will expand crop harvesting areas. As crops can be transported in large quantities more efficiently, larger chunks of land will be allocated to farming. Increasing farmland acreage and location pushes native animals out of their natural habitat, threatens already endangered species. Rather, the Brazilian government should focus on transportation projects outside the boundaries of the Amazon rainforest to mitigate the political risks. Furthermore, the ability of rail networks to transport goods such as soybeans and corn quicker will expand crop harvesting areas. For example, soybean production, which comprises almost 50% of Brazil's grain exports, would increase by nearly 20% in one year.[65] As crops can be transported in large quantities more efficiently, larger chunks of land will be allocated to farming. Increasing farmland acreage and location pushes native animals out of their natural habitat and threatens already endangered species. While there are risks involved, Transportation infrastructure Expansion could aid the expansion of renewable energy projects as the establishment of new transport lines could increase the efficiency of renewable energy transfer as well as material goods.

Environmental Risk

Along with transportation, Brazil is striving to diversify its renewable energy sources. While the country possesses a sizable renewable energy

59 Ivana Capozza, "OECD Environmental Performance Reviews: Brazil 2015," Environmental country reviews (OECD, November 4, 2015), https://www.oecd.org/environment/country-reviews/.
60 Ibid,.
61 Maria S. Araujo, Vânia Barcellos Campos, and Renata Albergaria Bandeira, "An Overview of Road Cargo Transport in Brazil," An Overview of Road Cargo Transport in Brazil (International Conference on Industrial Engineering and Operations Management , July 11, 2012), https://abepro.org.br/biblioteca/icieom2012_submission_260.pdf.
62 Tarso Veloso, "Brazil Infrastructure Upgrades Close Logistics Gap in Soybean Exports," AgUpdate (Iowa Farmer Today, September 16, 2022), https://www.agupdate.com/iowafarmertoday/news/state-and-regional/brazil-infrastructure-upgrades-close-logistics-gap-in-soybean-exports/article_56367946-344f-11ed-b11a-d726542a00ef.html.
63 Jose Branco et al., "Evaluation of the Economic and Environmental Impacts from the Addition of New Railways to the Brazilian's Transportation Network: An Application of a Network Equilibrium Model" (Transport Policy, March 21, 2020), https://www.sciencedirect.com/science/article/pii/S0967070X20300263?casa_token=75UOSDi3rYQAAAAA%3ApwOLK6MPDn2uTN3FPS_2OUKmsQeQRXvyTvL4uVoMQ7BgDuHUv-qPMWtnTDO6fVC4MJ5zNDRuRA.
64 Ibid,.
65 Sara Schafer, "Record on Tap: Brazil's Soybean Acres Will Exceed 100 Million for the First Time," AgWeb (Farm Journal, August 30, 2022), https://www.agweb.com/news/crops/soybeans/record-tap-brazils-soybean-acres-will-exceed-100-million-first-time#:~:text=20%25%20Increase%20for%20Soybean%20Crop,total%20grain%20produced%20in%20Brazil.

infrastructure network, Brazil suffers from being too reliant on one source of energy. Currently, about 60% of Brazil's energy is harvested from hydroelectric dams located throughout Brazil's river system. This presents risks, as droughts increase in frequency, the water levels in reservoirs and waterways decrease, resulting in less energy being available to generate. [66] Recent drought years include 2005, 2010, and 2015. As of 2021, many of Brazil's hydroelectric plants are operating at half capacity due to a lack of replenishing rainwater, even if the region is no longer in a drought[67]

The pervasiveness of droughts are leading Brazil to increase investment in wind farm infrastructure, with the goal of doubling its current output capacity by 2029[68] Currently, 9% of Brazil's energy comes from wind power.[69] While wind energy is a viable renewable energy source that helps lower carbon emissions, care must be taken when deciding where to construct wind farms, as some ecosystems are more delicate than others. For instance, 90% of Brazil's wind farm infrastructure is in sensitive biomes such as shrublands known as Caatinga. This ecosystem is prone to desertification and rapid degradation when utilized by humans, which threatens native plants and animals.[70] Biome degradation is also a considerable risk when considering where to place solar panels to extract solar energy.[71] To mitigate risks, alternative sites should be considered when expanding Brazil's energy sector, prioritizing locations already manipulated by human activity with the proper permits, which would providing natural areas and sensitive ecosystems a chance to thrive.

66 Iea, "Brazil - Countries & Regions," IEA (International Energy Agency , October 28, 2021), https://www.iea.org/countries/brazil.
67 Luz Adriana Cuartas et al., "Recent Hydrological Droughts in Brazil and Their Impact on Hydropower Generation," MDPI (Multidisciplinary Digital Publishing Institute, February 16, 2022), https://www.mdpi.com/2073-4441/14/4/601.
68 Olga Turkovska et al., "Land-Use Impacts of Brazilian Wind Power Expansion," Land-use impacts of Brazilian wind power expansion (Environmental Research Letters, January 21, 2021), https://iopscience.iop.org/article/10.1088/1748-9326/abd12f.
69 Ibid,.
70 Ibid,.
71 "Environmental Impacts of Solar Power," Environmental Impacts of Solar Power (Union of Concerned Scientists, March 5, 2013), https://www.ucsusa.org/resources/environmental-impacts-solar-power.

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