# BRAZIL INFRASTRUCTURE ASSESSMENT

## Developing a resilient, sustainable, and inclusive response to Brazil's recovery process

BRAZIL POLICY NOTES

THE WORLD BANK
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# Key messages

01

Brazil's **path to economic recovery will be challenging** given the country's legacy of structural and fiscal vulnerabilities

02

**Infrastructure development** will be key to the country's recovery efforts and ensuring long-term, sustainable growth

03

Policy reforms in the infrastructure sector **have resulted in diminished investments**

04

Persistently **low levels of investment have depleted Brazil's infrastructure** stock

05

Public investments must be designed **to maximize net benefits**

# Climate change, inclusion and productivity: An analytical framework for long-term economic growth in Brazil

## 1 Gross Domestic Product (GDP), provide only a partial picture of a country's economic development.

Sustained productivity growth related to human and physical capital depends on continuous, long-term investments - "the lack of clean water and adequate sanitation can significant undermine educational outcomes"

Choosing the most appropriate, long-term investments depends on multiple factors. Reinvest finite natural resource rents into renewable activities can yield sustained returns over the long term.

## 2 Investing in infrastructure is key to boosting Brazil's long-term productivity.

Low productivity weighs down a country's ability to promote investments and economic growth. Developed economies are overwhelmingly more productive than Brazil across all sectors – including in agriculture.

Long term productivity growth is further threatened by climate change. Disasters such as floods, landslides and ecosystem fires affect infrastructure, diminishing productivity.

## 3 An absence of appropriate coping strategies mean climate change impacts are more likely to affect the poor.

Infrastructure is one of the most important forces driving poverty reduction.

- Transportation infrastructure spurs economic development through reductions in transport costs.
- Reliable water and sanitation can reduce the risks of water-borne illnesses, reducing productivity.
- Energy infrastructure services, such as street lighting, affect economic productivity and improve quality of life through increased accessibility and safety.

# What is the status of infrastructure in Brazil?

I Inequality gap

II Infrastructure gap

III Inefficiency of infrastructure services

# Access to Basic Infrastructure Services: The inequality Gap

(Almost) All Brazilians have access to electricity and water at home.

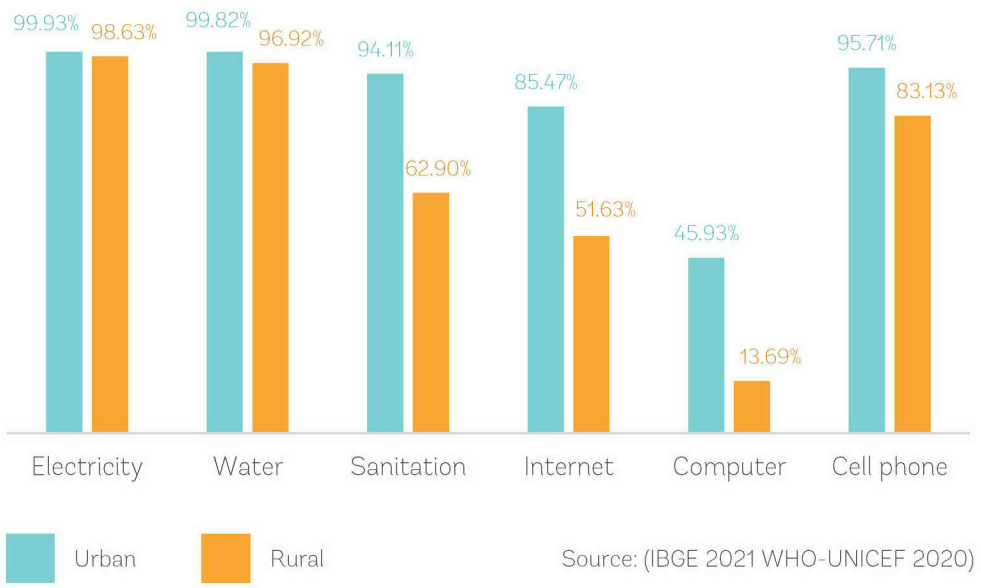
Sanitation coverage lag significantly.

Certain population groups continue to be overly affected.

Indigenous people are more likely than other demographics to lack access to basic infrastructure

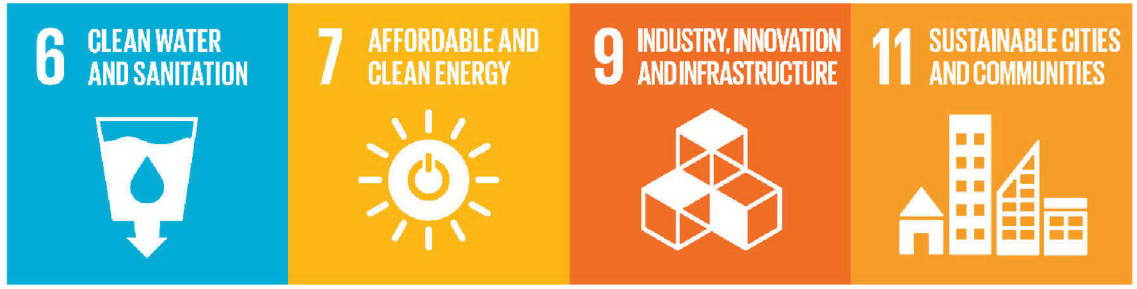
Almost 3 in 10 poor Brazilians are Afrodescendant women living in urban areas, and three-quarters of all children living in rural areas are considered poor (World Bank 2022)

Brazil has achieved near universal access to several key infrastructure services, but progress has been uneven.




Source: (IBGE 2021 WHO-UNICEF 2020)

# Diagnosing Brazil`s ailing infrastructure sector




Bridging the infrastructure gap speaks to the financial investment needed to:

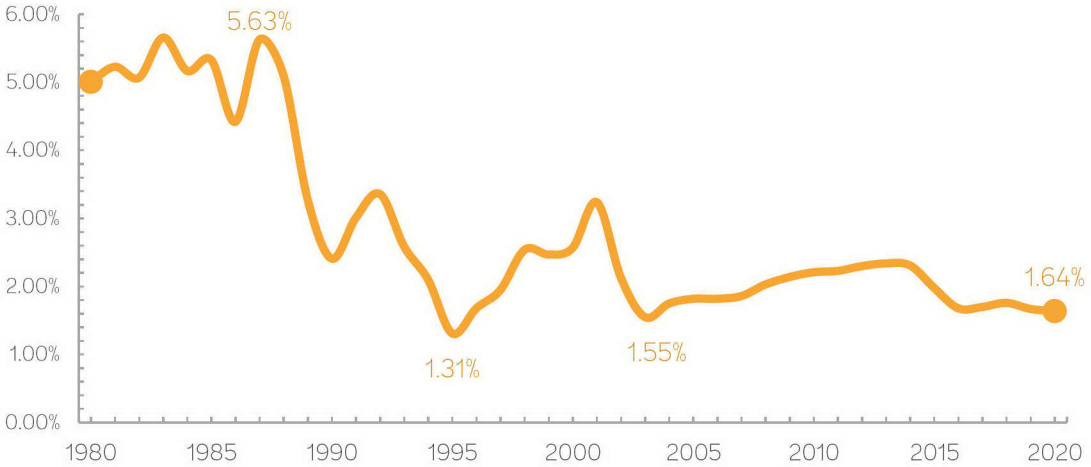
- Achieve universal access to water and sanitation
- Energy, and digital services
- Robust transport infrastructure networks

Brazil must invest US$778 billion (or 3.7% of GDP per year) to bridge its infrastructure gap by the SDG deadline of 2030

Actual investments are likely to be higher

"Non-efficient spends increase the cost of building infrastructure by about 35 percent on average in LAC" (Serebrisky et al. 2017).

Figura ES.1. **Total investment in infrastructure in Brazil as a percentage of GDP (1980–2020)**



# Inefficiency of Infrastructure Services: A Costly Pattern of Neglect

**Operational inefficiencies** in the transport and water and sanitation **sectors cost around 1.4 percent of GDP**

The overreliance on **roads** to transport **freight is extremely expensive**.

Electricity **tariffs in Brazil are among the highest in LAC** with considerable variation between the prices paid by customers in each of the 63 concession areas.

In Brazil, **almost one-third of all water produced is lost**.

**An underdeveloped multimodal transport system presents a real bottleneck to productivity in Brazil:**

- Logistics solutions have been designed primarily to meet the needs of the country's agribusiness sector
- Logistics infrastructure, and multimodal transportation solutions in particular, have suffered from a lack of public investment
- Brazil has been slow to improve the business environment needed to render the sector more attractive to private investors
- Brazil's tax arrangements disincentivize a more integrated logistics system

# What are the World Bank recommendations for a policy framework?

I **Public** Investment

II **Maximize** impact and focus on strategic priorities

III **Increase** technical capacity at subnational level

# Recommendation 1: Brazil urgently needs to increase public investment in infrastructure to stop its depletion, expand access, improve quality, and thereby increase the productivity and competitiveness of the economy

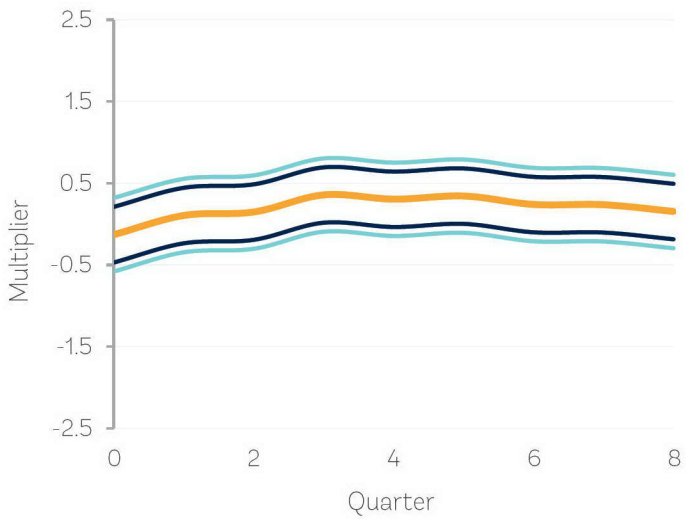
1. **Our estimates** suggest a **minimum of 3.7 percent** of GDP per year will be needed through 2030 to ensure Brazil meets its infrastructure-related SDGs.

2. **Additional investments will be needed** to keep pace with Brazil's climate of extremes and support the economy's transition to sustainable power generation. While private investment will of course be needed to achieve this ambitious goal, public investment is imperative.

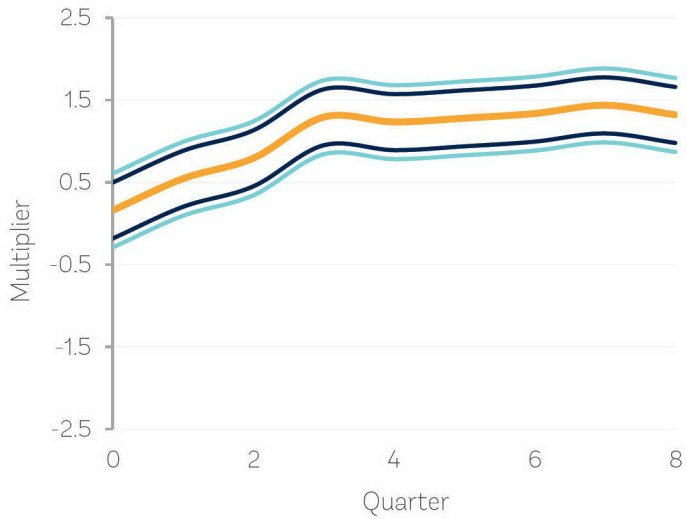
3. **New research** conducted for this report suggests the **multiplier effect** on Brazil's economy from public investment by the federal government is **at least twice as high as that for public consumption**.

## Government Spending Multipliers in Brazil: Public Consumption vs Public Investment

Panel A Public Consumption




Panel B Public Investment

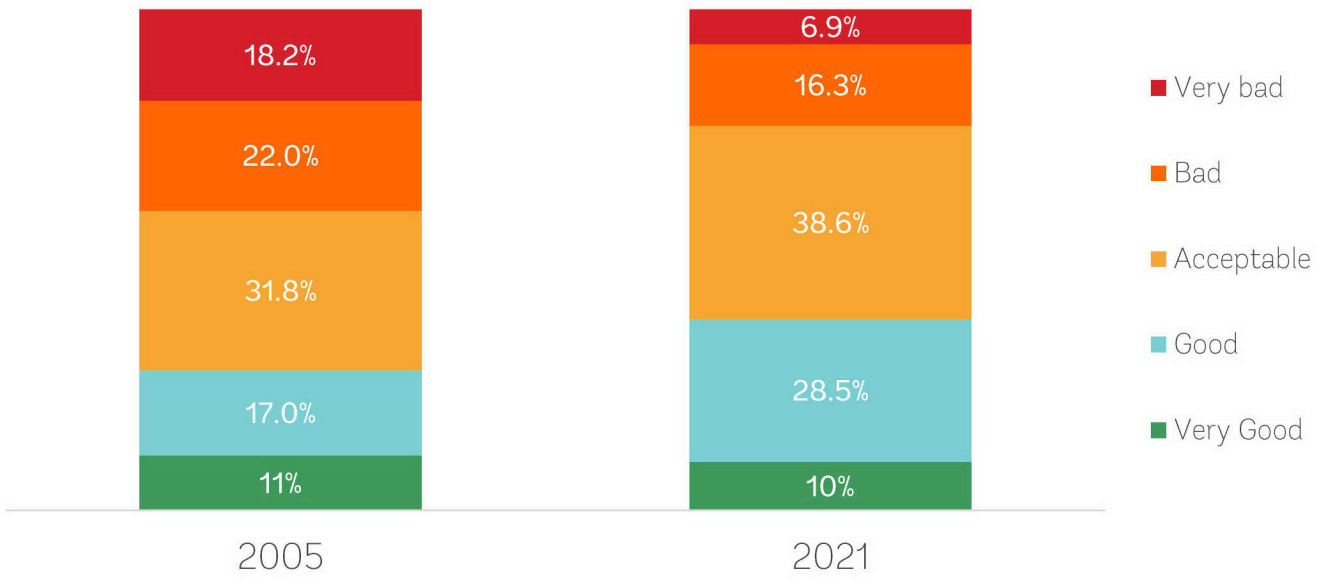


# Recommendation 2: To maximize the impact of its infrastructure investments, Brazil needs to establish a set of strategic investment and policy priorities that will yield cost savings and enhance productivity and global competitiveness

1. **Identifying** and prioritizing key areas in need of urgent attention, such as the **maintenance of existing road infrastructure**, will lead to future cost savings and when combined with the sustainable expansion of rail and waterways will strengthen Brazil's position as one of the world's top agricultural producers and exporters.

2. **Meanwhile, investing in universal access to basic services and building resilient infrastructure** as part of a broader disaster prevention and management program will help address Brazil's inequalities while safeguarding the country's future labor force.

## Changes in Perception of Road Quality in Brazil (2005-21)



# Recommendation 3: Brazil needs to increase technical capacity, particularly at subnational levels, to plan, deliver, and manage infrastructure assets better, and increase private participation

1

**Brazil has one of the highest degrees of fiscal decentralization and strongest public-private investment (PPI) frameworks among Latin American countries**. But, planning capacity in Brazil, especially at the subnational level, is comparatively weak. Many states remain caught in a perpetual cycle of impoverishment given the lack of (i) good-quality, reliable infrastructure; and (ii) capacity to secure and regulate resources needed to expand access to, and maintain, new infrastructure.

2

**Certain skills and structural bottlenecks are unique to PPI**, for example, project structuring and financial instruments. Targeted support to low-capacity municipalities and states, including alternative financial instruments will help create a more robust PPP pipeline while ensuring wider participation by local governments.

3

While overall capacity is without a doubt a major harbinger of success, **small changes** in governance and capacity building efforts targeting key areas, such as regulation, **can also go a long way** to increasing sector performance.

4

History has shown that **without a solid governance framework**, and a political commitment to capacity building, most other **recommendations are likely to fail**.

# What are the World Bank recommendations for specific sectors ?

Transport

Electricity sector

Water and sanitation

Water resource management

Digital development

Private sector participation

# Transport: Roads Sector

## KEY FINDINGS

- Little attention is given to maintenance and roads suffer from accelerated degradation.
- Brazilian road infrastructure is not prepared for extreme weather events.
- Brazil's transport system is not integrated and relies heavily on the road network.
- Almost half (45%) of all energy-related CO2 emissions stem from vehicles.
- Traffic-related accidents are one of the leading causes of death in the country, especially among young people.

## POTENTIAL POLICY RECOMMENDATIONS

- Support adoption and implementation of the PRIMP, including preparation of road infrastructure for the implementation of intelligent transport systems (ITSs).
- Support initiatives designed to increase resilience to climate change.
- Integrate the road network with other modes of transport, especially railways, improving logistics for the flow of, among other sectors, agro-industrial production.
- Support the transition to electric vehicles.
- Support measures designed to improve road safety.

# Transport: Urban Mobility

## KEY FINDINGS

- Mass transit systems have seen a steady decrease in ridership in the last decade, a trend that was reinforced with the recent mobility restrictions arising from COVID-19.
- Transport systems have been struggling to survive with tariff revenues only.
- Demand for cars and motorcycles have been increasing, leading to increased greenhouse gas emissions and road incidents.
- There are few incentives for municipal operators to buy e-buses. Brazil manufactures and exports diesel buses and does not have import tax exemptions or incentives for manufacturing e-buses.
- There are few incentives to improve road safety and adequate infrastructure to promote sustainable active mobility.

## POTENTIAL POLICY RECOMMENDATIONS

- Regulatory framework to support municipalities to receive alternative revenues to support transit systems.
- At the subnational level, reform bus contract models by (i) unbundling operations from fleet provision and fare collection management to leverage private sector participation and increase system efficiency; and (ii) changing the remuneration formula to improve service quality, by remunerating costs and performance as well as implementing technical and user tariffs to reduce demand risks.
- Promote use of electric vehicles for public transportation through financial and nonfinancial incentives, to support energy transition to sustainable mobility.
- Support metropolitan authorities to integrate and monitor intermodal and metropolitan transport, including increased monitoring capacity with technology and innovation, fare integration, mobile payment, etc.

# Transport:
# Railways - Commuter Rail and Metro Systems

## KEY FINDINGS

- Incomplete decentralization of passenger rail from the federal to regional governments.
- Lack of a regulatory framework for passenger railways.

## POTENTIAL POLICY RECOMMENDATIONS

- Rapid conclusion of transfer of passenger rail network to regional governments.
- Create specific regulation for rail passenger systems at national level, acting as guidance for regional regulations and to attract private investment.

# Transport:
# Railways - Freight Sector

## KEY FINDINGS

- Innovation in contracting mechanisms to attract private investment and decentralize the sector.
- Technical challenges in operating the rail network have affected its efficiency and logistics integration across the country.
- Consolidation of the emerging regulatory framework and authorization regime.

## POTENTIAL POLICY RECOMMENDATIONS

- Reforms in the accounting framework to accommodate payment and credit guarantee mechanisms.
- Establishment of comprehensive norms for interoperability, to promote standardization of railways.
- Clear definitions regarding the authorization regime, to safeguard trunk corridors and limit space for policy-driven decision-making.

# Transport: Port Sector

## KEY FINDINGS

- The rapid expansion of exported volume has led to bottlenecks in the infrastructure for accessing ports.
- Difficulty coordinating different regulatory entities involved in port operations (e.g., roads, railways, waterways, and pipelines.

## POTENTIAL POLICY RECOMMENDATIONS

- Adoption of cross-sector commitments, including obligations of complementary investments in other modes of transport.
- Better coordination of regulatory agencies, guided primarily by the National Logistics Plan.

# Transport: Airport Sector

## KEY FINDINGS

- Brazil suffers from a very high cost of the jet fuel (Jet A-1), accounting for as much as 30% of the airline's operating costs; taxes on fuel are also an important component of the cost.
- There seems to be an abuse of consumer protection rights; lack of capacity by the government to differentiate manipulative from valid claims.
- Safety/security, infrastructure, airspace, air cargo, and regulatory inefficiencies.
- Concession of airports to private operators has derived high costs for the use of infrastructure.
- The aviation sector is heavily taxed where duties are applied to most components of the value chain.
- Lack of a formal program of public service obligations to serve essential air routes.

## POTENTIAL POLICY RECOMMENDATIONS

- Jointly work with IATA and ALTA aiming at a reduction in the tax composition of aircraft fuels or exploring the possibility of importing it directly.
- Adopt international practices with respect to conflict resolution and the creation of alternative instances for mediation.
- Implementation of regulations addressing issues with respect to carbon dioxide emissions, availability of biofuels, and prices for cargo storage.
- Involvement of the airlines in the formulation of airport concession contracts, supervising operational and financial aspects.
- Adoption of a new simpler fiscal system, competitive and consistent with the development of the industry.
- Development of a Public Service Obligation program on essential services to new destinations.

# Transport: Electricity Sector

## POTENTIAL POLICY RECOMMENDATIONS

- Maximizing long-term innovation and competitiveness benefits from renewable electricity and frontier energies: offshore wind policy, green and blue hydrogen infrastructure deployment for domestic uses and exports (including steel, etc.), and ethanol market diversification.
- Reducing cost of climate inaction and risk of electricity sector "recarbonization" and stranded assets: carbon market development.
- Managing electricity supply risk: repowering hydro, increasing hydropower resilience and the electricity system's flexibility (transmission, storage, forecast, hydro-hybridization).
- Strengthening the financial strength of the electricity distribution sector: net billing, time-of-use tariff, management of system's costs, development of nontraditional business models, consumer protection.

# Water and Sanitation

## KEY FINDINGS

- Implementation of WSS reforms and the 2020 Law are targeting larger urban centers and primarily water supply, while limited emphasis has been given to underserved areas including rural, indigenous, and informal settlements, particularly to improve access to sanitation.
- The country will need to do more with less resources and find ways to optimize its budgetary allocation and spending efficiency through strong governance systems within the sector.
- The recent COVID-19 crisis and its impact on the water sector has reinforced the importance of building the sector's resilience against such climate- and non-climate-related shocks and crises. It is imperative that actions be taken to reduce impacts in cities, such as integrated urban water management, and on the circular economy, including flood and drought monitoring and preparedness, and nature-based solutions to improve resilience.

## POTENTIAL POLICY RECOMMENDATIONS

- Develop a strategic plan to expand access to underserved areas, for example, develop and implement institutional and integrated models for urban and rural WSS expansion, for underserved urban areas, WSS services should be integrated with policies and investments for land use and social housing.
- Improve coordination between ANA and the National Health Foundation (FUNASA) to ensure compliance with the conditions and targets established in federal and local guidelines.
- Improve efficiency and governance, for example, federal and state budgeting processes can be brought to bear to incentivize greater WSS investments and improvements in service providers' operational and commercial efficiency, and performance-based contracts can improve the quality of the implementation of the law, and make budget execution transparent and efficient.
- Build resilience against climate and other crises by adopting climate adaptation and mitigation measures.
- Supporting integrated urban water management could help advance the water security agenda, and improve the availability of water for various productive and nonproductive uses.

# Water Resource Management

## KEY FINDINGS

- The perception of water abundance in Brazil must be changed. WRM is needed to support development opportunities, securing water for multiple, competing demands and improving water quality, enabling more return on invested capital.
- Water value is increasingly evident and WRM becomes necessary to evidence the value to society, find economic solutions to maintain and expand the existing infrastructure, and propose allocation arrangements that consider the economic value of other water uses, avoiding losses in existing investments and conflicts with other water basins.
- WRM systems are linked to other sectors, especially hydropower. It is important to seek balanced water allocation solutions to avoid optimal solutions from one sector reflecting negatively on others. Solutions need to be flexible with the capacity to accommodate impacts from extreme events.
- Climate change is reflecting on WRM now: the future water security relies on today's adaptive actions. It is important to share and coordinate governance actions, sector policies, planning and operation of mid- and long-term infrastructure, and contingency measures against extreme events.

## POTENTIAL POLICY RECOMMENDATIONS

- Integrate sector planning for water use (e.g., sanitation, energy, irrigation/livestock, industry, water infrastructure for multiple uses, and environment) with water resources planning.
- Improve watershed-level water resources planning, especially in transboundary basins.
- Strengthen role of the National Water and Sanitation Agency (ANA) (responsible for implementing the National Water Resources Policy), especially in supporting and strengthening decentralized and participatory WRM.
- Structure state management agencies according to WRM complexity and improve their effectiveness to properly operate and perform their functions.
- Seek strategies and mechanisms for sustainable WRM.
- Develop an integrated and coherent financial plan for WRM.
- Negotiate and plan the allocation of water resources considering the different objectives and regional, current, and future demands.

# Digital Development

## KEY FINDINGS

- The rural-urban divide is considerable, with 92% of the urban population using the internet, compared to only 75% in rural areas (IBGE 2022).
- More than half of fixed broadband subscriptions (58%) exhibited speeds above 12 megabits per second in June 2019.
- In 2020, Brazil approved legislation (Law 14109/2020) governing the USF to expand broadband services. One of the first projects proposed is to improve connectivity in schools.
- Brazil suffers from more cyberattacks than any other country in LAC with an average of 1,390 attacks per minute.
- Claro and Telefónica's 5G networks now serve 15 and 8 cities, respectively.

## POTENTIAL POLICY RECOMMENDATIONS

- Enhance coordination among federal, state, and municipal levels to promote deployment, and the quality and reliability of services.
- Initiate the implementation of projects funded by the Universal Service Fund (USF) to improve connectivity, including connecting schools and support for the newly created Group for Monitoring the Costing of School Connectivity Projects.
- Implement the National Cybersecurity Strategy by establishing a wide community of digital security leaders from the public and private sectors.
- Support the Monitoring Group for the Implementation of Solutions to Interference Problems in bands 3,625 to 3,700 megahertz (GAISPI) to accelerate 5G deployment.

# Private Sector Participation

## POTENTIAL POLICY RECOMMENDATIONS

- Establish a national long-term strategic vision that addresses infrastructure service needs.
- Manage the integrity and corruption threats at all stages of the process, from project conception to delivery.
- Establish clear criteria to guide the choice of delivery mode (PPP vs direct public provision, etc.).
- Ensure good regulatory design and maintain a predictable regulatory framework for investment.
- Integrate a consultation process early enough so that decisions benefit from real stakeholder engagement.
- Coordinate infrastructure policy across levels of government in such a way that investment decisions by central and subnational governments are coherent.
- Guard affordability and value for money by using and applying cost-benefit and other methods rigorously and consistently.
- Generate, analyze, and disclose useful data to increase transparency and ensure accountability.
- Integrate mechanisms to evaluate the performance of assets throughout their life cycle.
- Review existing infrastructure resilience in the face of evolving natural and manmade risks and develop guidelines to future proof new infrastructures.

# Thank you!

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