



Green Infrastructure Investment Opportunities

BRAZIL 2019



Climate Bonds INITIATIVE

Report prepared by
Climate Bonds Initiative

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In partnership with
Inter-American Development Bank

Green Infrastructure Investment Opportunities, Brazil 2019

This report highlights green infrastructure investment opportunities in Brazil

This report has been prepared to help meet the growing demand for green investment opportunities - including green bonds - as well as to support the country's transition to a low carbon economy.

It aims to facilitate greater engagement on this topic between project owners and developers, and institutional investors. Green infrastructure and corresponding green finance instruments are explored in the report, with sector-by-sector investment options presented.

The report is intended for a wide range of stakeholders in Brazil, including domestic superannuation funds and asset managers and their global counterparts, potential issuers, infrastructure owners and developers, as well as relevant government ministries.

In developing this report, the Climate Bonds Initiative (CBI) consulted with key government bodies, industry, the financial sector, and infrastructure companies - in partnership with the Inter-American Development Bank (IDB). We would like to thank our partner, along with Pinheiro Neto Advogados, who contributed the 'Legal and regulatory interventions' section to the report.

GIIO Report Series

Green infrastructure presents a huge investment opportunity globally, with an estimated USD100tn worth of climate compatible infrastructure required between now and 2030 in order to meet Paris Agreement emissions reduction targets. However, there remains a lack of identifiable, investment-ready and bankable projects. There is also a lack of understanding of what types of assets and projects qualify for green financing.

In response to this challenge, CBI is developing a series of reports that aim to identify and demonstrate green infrastructure investment opportunities around the world. By so doing, it aims to raise awareness of what is green and where to invest, and to promote green bond issuance as a tool to finance green infrastructure.

The series commenced with the Green Infrastructure Investment Opportunities (GIIO) Indonesia report, launched in May 2018, followed by the Australia and New Zealand GIIO report, released in August 2018, and, most recently, the Australia GIIO 2019 report. The pipeline of GIIO reports being developed includes further exploration of opportunities in Asia-Pacific as well as opportunities in Latin America.

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Climate Bonds Initiative

The Climate Bonds Initiative is an international investor-focused not-for-profit organisation working to mobilise the USD100tn bond market for climate change solutions.

It promotes investment in projects and assets needed for a rapid transition to a low carbon and climate resilient economy. The mission focus is to help drive down the cost of capital for large-scale climate

and infrastructure projects and to support governments seeking increased capital markets investment to meet climate policy and GHG emission reduction policy and GHG emission reduction goals.

The Climate Bonds Initiative carries out market analysis, policy research, market development; advises governments and regulators; and administers a global green bond standard

and certification scheme. Climate Bonds Initiative screens green finance instruments against its Climate Bonds Taxonomy to determine alignment and uses sector specific criteria for certification.

The Climate Bonds Taxonomy is on the back cover. Please see p. 31 for information on the Climate Bonds Standard and Certification Scheme.

Green infrastructure: an opportunity for growth

In Brazil, the effects of climate change and the risks associated with a greater than 2°C rise in global temperatures by the end of the century are significant: rising sea levels, increased frequency and severity of storms as well as droughts, wildfires and changes in agricultural patterns and yields.

Investment in low carbon solutions will be essential for mitigating climate risk and meeting global emission reduction pathways under the Paris Climate Change Agreement. Given that climate volatility as a result of global warming is already happening in Brazil, all new infrastructure should be designed as climate resilient.

Over 85% of Brazil's population currently lives in cities and the rapid expansion of the country's urban areas will require a substantial deployment of infrastructure over future decades. Failure to consider climate change impacts in infrastructure planning poses serious economic risks at a national level, including severe economic losses.

Brazil has an estimated USD1.3tn green investment potential for energy, transport, buildings, waste and industrial energy efficiency, based on its climate commitments set out in the Nationally Determined Contribution (NDC).¹ The majority of this is in renewable energy and urban infrastructure, including public transport, water and waste.

Infrastructure finance in Brazil has been mostly limited to public financing, including financing from the Brazilian Development Bank (BNDES), or individual investors who buy incentivised infrastructure debentures due to a tax benefit.

In recent years, the Brazilian Government has been increasingly working on leveraging institutional capital to finance public infrastructure, which includes a new guideline for BNDES' role and the creation of Investments Partnership Program (PPI) Secretariats to better coordinate ministries and stakeholders. Brazil also has hundreds of billions of dollars in assets under management by institutional investors,

particularly pension funds, which are traditionally allocated to government bonds.

As public funding is not sufficient to meet the growing demand for infrastructure spending, investments from development partners and the capital markets are expected to continue to increase in importance. According to the World Bank, annual investment requirements between 2015 and 2025 amount to 4.35% of GDP, with higher needs in transportation (1.91% of GDP) than in any other sector in infrastructure.²

Integrating climate mitigation and resilience criteria into mainstream infrastructure planning would provide Brazil with the opportunity to access new capital flows that are looking for green investments, especially on the international market. Over the past few years, there has been an increasing demand from institutional investors, particularly from OECD countries, for investment opportunities that mitigate the risks arising from climate change, deliver social impact and support sustainable development.

BRAZIL: COUNTRY FACTS

Population: **211,313,335** (2019)

Population growth rate: **0.75%** (2019)

Urban population: **87.4%** (2019)³

GDP: **USD1.868tn** (2018)

Interest rate (cash rate): **5.5%** (September 2019)

Inflation rate: **3.22%** (end of Q3 2018)

Government 10Y, M: **7.36%** (end of July 2019)

Balance of trade: **USD32.8bn** (end of July 2019)⁴

Government debt to GDP: **77.22%** (end of December 2018)⁵

Moody's rating: **Ba2** (stable)

S&P rating: **BB-** (stable)

Fitch rating: **BB-** (stable)

Green infrastructure: an opportunity for growth

Green finance presents an opportunity to improve a challenging macroeconomic outlook

Buoyed by macroeconomic stability and favourable demographic trends and external conditions, Brazil's strong growth and remarkable social progress over the past few decades made it one of the world's leading economies. It has kept its position among the top ten largest GDPs in the world since 2007, growing at an average of approximately 2.72% per year in the last decade.⁶ In the last few years, however, the country's deepest ever recession and a series of adverse political events have reversed the positive trend.

Since the economic downturn between 2014 and 2016, there has been a mild recovery, and GDP grew 1% in 2017. However, this has not reversed the deterioration in government finances. Non-financial public-sector debt rose sharply between 2016 and 2017 from 78.3% GDP to 84%. The worsening public finances have resulted in a deterioration in its credit rating, which S&P down-graded in January 2018 from BB to BB-. Moody's gives Brazil a rating of Ba2. These low credit rating means Brazil's sovereign debt is not investment grade.

Despite stagnant GDP growth, Brazil's external position has remained strong, supported by a flexible exchange rate, large reserves, and contained current account deficit, fully financed by large foreign direct investment inflows.⁷ GDP is set to grow by between 1% and 1.5% by the end of 2019. The central bank reduced the base interest rate to a historic low of 5.5% in September 2019, after holding it at 6.5% since March 2018 and providing the economy with some monetary stimulus.⁸ This will provide more favorable conditions for investors.

Economic recovery and restoring fiscal sustainability remain the current administration's most pressing economic challenge. Accordingly, the government has included in its agenda reducing state intervention in credit markets, lowering trade barriers, tackling corruption and simplifying taxation.⁹ In the last few years, the Brazilian government has also been working on ambitious privatization programs, to accelerate productivity and investment in infrastructure and energy.

At 2.1% of GDP, Brazil has one of the lowest shares of infrastructure spending, in comparison to its regional peers.¹⁰ Higher investment will be required to

ensure proper maintenance of existing infrastructure, by eliminating bottlenecks and expanding access to social services.¹¹ This will require improving the government's planning capacity, improving the regulatory framework and leveraging private capital to finance investment.¹² Green finance presents an opportunity for infrastructure investment, although there first needs to be a robust pipeline of green projects that can attract green capital.

In the context of this report, four sectors have been explored due to their great potential for attracting green investment and tackling infrastructure gaps in the country. These sectors are low carbon transport, renewable energy, sustainable water management and sustainable waste management. Further context on the selection of projects can be found in CBI's policy brief published under the InfralInvest Programme.¹³

Green infrastructure can help to fill funding gaps as well as meet climate change commitments

Green infrastructure has positive environmental and economic benefits. It can create prosperity by increasing competitiveness, productivity and employment opportunities; extending the reach, reliability and efficiency of the national electricity grid, without creating air pollution; broadening the economic base; creating new markets; and providing inclusion and connectivity across Brazil's vast landmass.

Delayed action increases the cost of change as well as the volatility and structural risks to the finance sector and underlying asset values. In this national environment, major stakeholders in banking, finance and superannuation have a responsibility to act. Adaptive and resilient infrastructure provision on an accelerated basis should become a core part of the national response to the coming climate emergency.

Brazil's climate goals

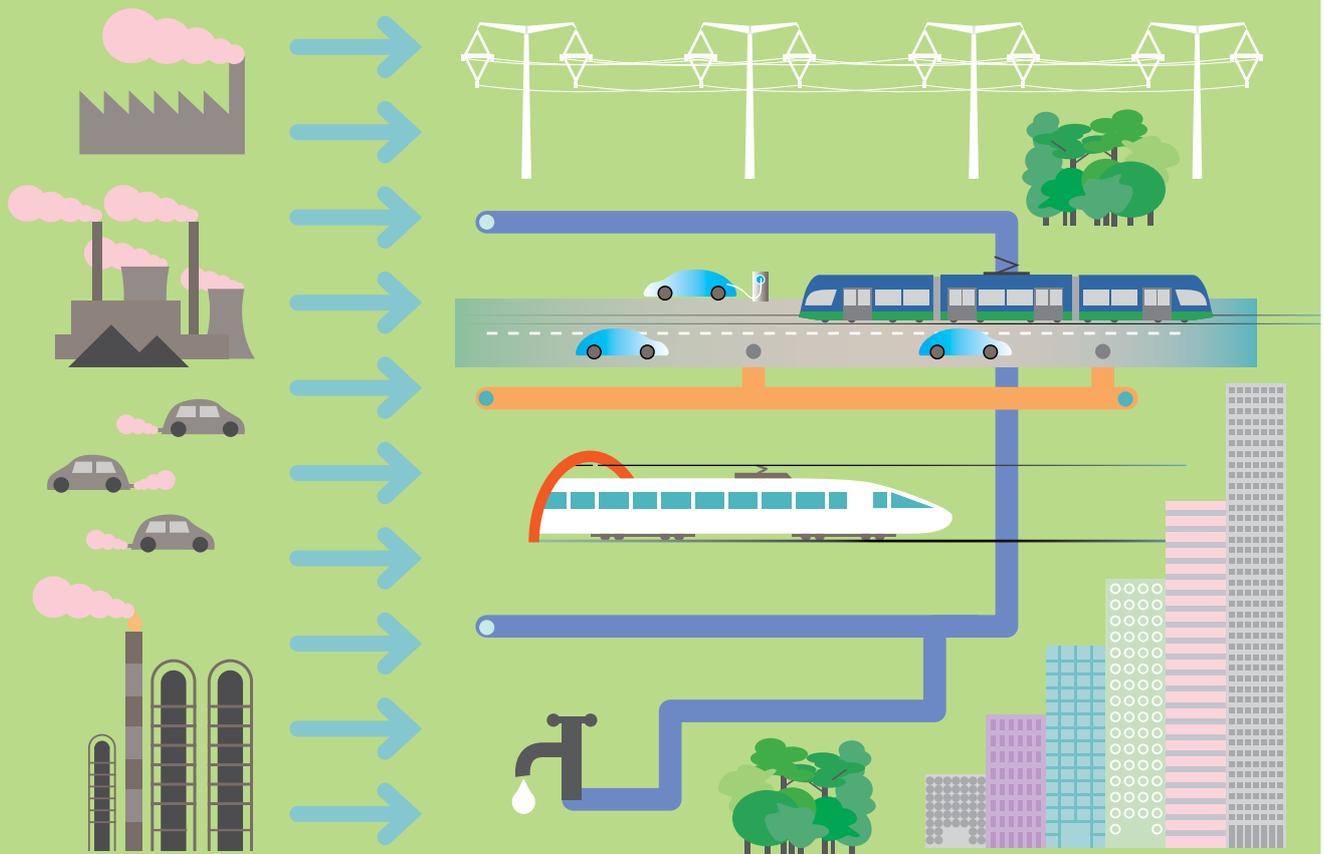
As part of its NDCs under the Paris Agreement, Brazil has defined the following mitigation targets:

- 37% reduction in green house gas (GHG) emissions, versus 2005, by 2025
- 43% reduction by 2030

To achieve these, it has also defined a number of sector-specific targets, including:

- Achieving 45% of renewables in its energy mix by 2030 - including expanding the use of non-hydro sources in the total energy mix to between 28% to 33% and increasing the share of renewables (other than hydropower) in the power supply to at least 23%; and increasing the share of sustainable biofuels to 18%.
- Strengthening and enforcing the implementation of the Forest Code to achieve zero illegal deforestation in the Amazon by 2030.
- Restoring 12 million hectares of forest by 2030.
- Strengthening the Low-Carbon Agriculture Programme (ABC), restoring an additional 15 million hectares of degraded pasturelands and enhancing 5 million hectares of integrated cropland-livestock-forestry systems (ICLFS) by 2030.

Brown to green transition in Brazil



The Climate Bonds Initiative has been active in promoting a brown-to-green (BtG) transition strategy in GHG-emissions intensive industries around the world. BtG reflects the fact that, in the short- to medium-term, large companies in many sectors will inevitably straddle both brown and green assets, progressively reducing exposure to brown assets and practices as they increase capex towards, and adoption of, greener modes of operation. It also embodies a recognition that, both globally and locally, the expectation of institutional investors is that progress towards low or zero-carbon business models, is increasingly indicative of corporate performance, hedging of climate risks and long-term value accretion.

Global green investment opportunities are growing and yet there remains a scarcity of offerings, pointing to a lack of supply of green bond issuance particularly from non-financial corporates, i.e. the real economy. Furthermore, segments of the real economy, that offer significant emissions reductions potential – such as cement and concrete, mining and metals, oil and gas transport and manufacturing – are yet to be activated towards a BtG transition. When such industry sectors start to align with a 2-degree emissions trajectory, new green financing opportunities could be created for assets and projects with ambitious climate targets and an increased focus on low carbon production modes.

A national BtG strategy should require 'brown' organisations to commit to strategic change, undertaking tangible and verifiably climate relevant measures that relate to companies' core business activities. They will need to progress from broad statements of strategy or intent to disclosure of climate risk as envisioned by compliance with the Task Force on Climate-related Financial Disclosures (TCFD) and, ultimately, to a visible reflection of green investment on balance sheets, in capex plans and borrowing programmes.

Credible green bonds are a highly visible means to support this transition from brown into green. Even a small initial share of green capital expenditure could be a credible indicator of more to come, if it is combined with a re-orientation and acknowledgment to investors that achieving low carbon targets and then zero-carbon operating models are inevitable business destinations between now and 2050.

Green finance trends, opportunities and challenges

There is a strong green finance momentum globally and massive further growth potential

The growing level of interest from investors in green projects has resulted in the development and growth of innovative financial products including green, social, ESG and sustainability bonds and loans; and green index products. Green bonds are currently the most developed segment of thematic instruments, carrying greater recognition from the investor base.

Green labelled products have become globally recognised as an effective means of directing investment capital towards climate change mitigation and climate change resilience and adaptation projects, including green infrastructure. To combat the effects of climate change, it is estimated that green bond issuance needs to reach USD1tn per annum by the early 2020s. A significant amount is expected to finance green infrastructure and assets in emerging markets.

Brazil's green bond market snapshot

The first Brazilian green bond was issued in June 2015. Brazil boasts the largest green bond market in Latin American and the Caribbean (LAC): its USD5.6bn represent 41% of the region's issuance to date. Brazil is also home to most of LAC's largest deals, with six of the region's eleven benchmark-sized bonds issued by Brazilian entities, including BNDES (USD1bn), Fibria (USD700m) – which is now part of Suzano – and BRF.

LAC green bond issuance

2017 was the "golden year" for the Brazilian green bond market so far, with 10 of the country's 21 bonds – and 21% of LAC's total volume to date – issued during that year. The country then experienced a more pronounced drop in issuance in 2018 (-92%) than the region (-49%) as a result of political uncertainty. However, volumes have picked

up again in 2019, and as of the end of June, had exceeded USD1bn.

More than almost any other country, Brazil's economy is heavily dependent on agriculture and forestry: two of the highest GHG-emitting sectors in the country. Perhaps due to this, Brazil's use of proceeds mix is quite unique. Land use and Industry, typically two of the least funded categories in the international market, are respectively the first and third most funded in Brazil, with Energy second. On the other hand, Transport and Buildings have very low allocations, accounting for 5% combined.

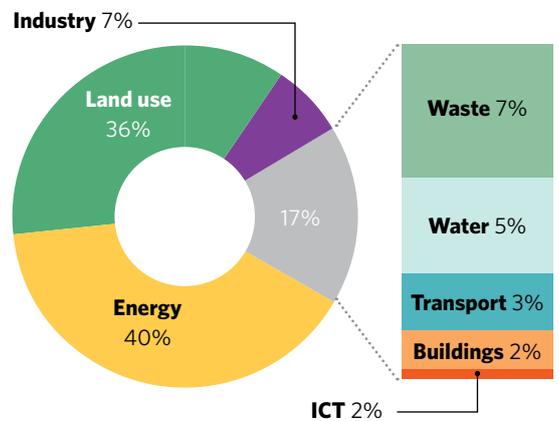
Green bonds have the potential to mobilise substantial portions of the capital required to transform the country's infrastructure in support of a low carbon economy and endure the risks of climate change.

For more information on the Brazilian green bond market, please see the [Latin America Green Finance State of the Market](#) report.

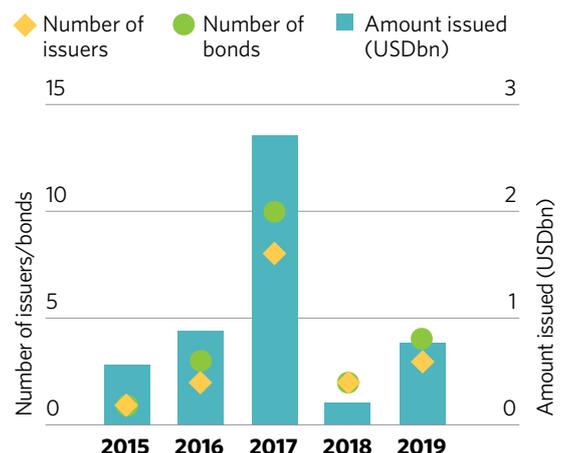
LAC green bonds issuance



Top 3 sectors: Energy, Land use and Industry



Issuance in Brazil (2015-2019)



Green finance trends, opportunities and challenges

Green finance is growing in Brazil

Despite a challenging macroeconomic outlook, green finance has huge growth potential in Brazil and could support the country in meeting its climate goals. Scaling up sustainable investment will mainly depend on the Brazilian Government's commitment to greening the economy, both through public and private sector investments.

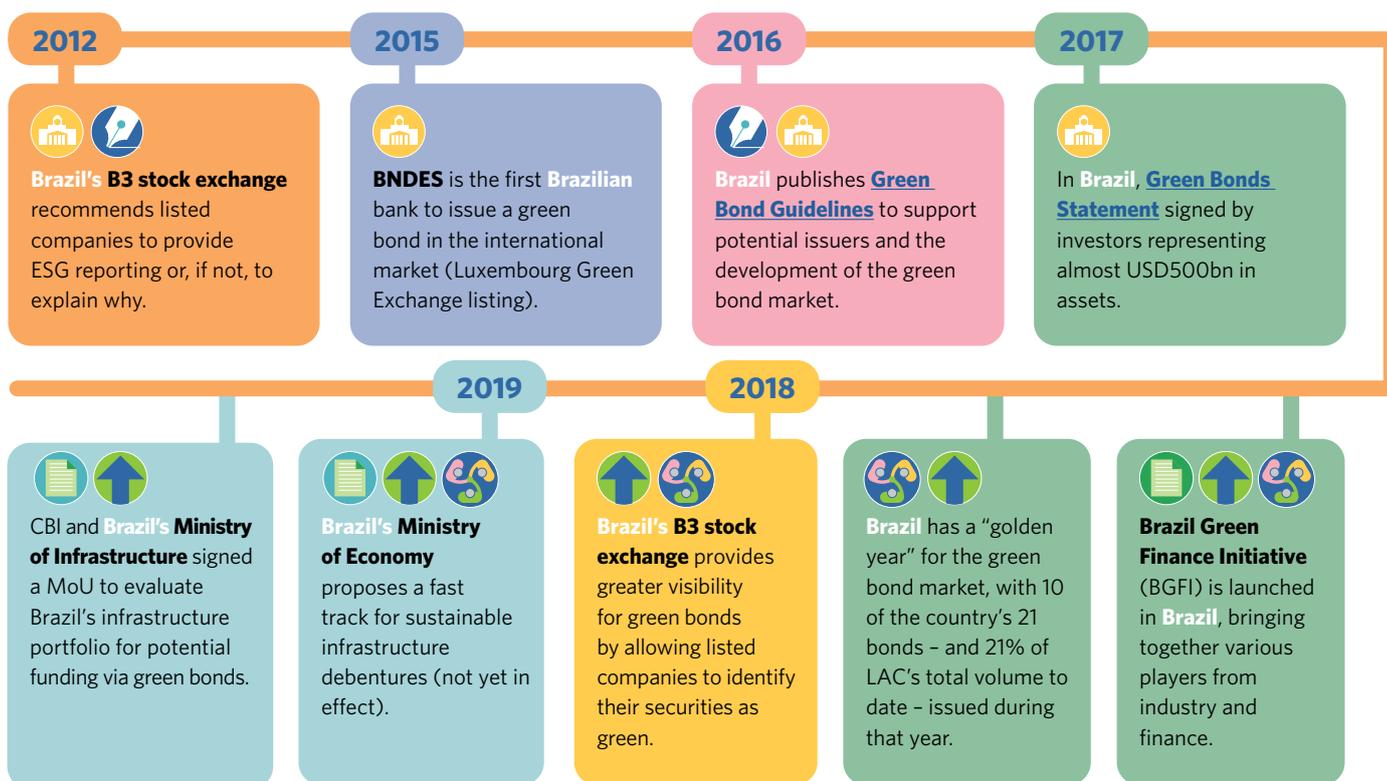
Public investment in green infrastructure has the power to set Brazil on a sustainable course for the long run, while sending an

important signal to the market and providing an opportunity for the country to access new capital. Green private sector investment can be facilitated by supportive policy.

The introduction of climate policies and related initiatives around green finance has grown rapidly in LAC countries in the last two years. Governments and industry groups are increasingly aware of the urgent need to invest in green infrastructure and promote sustainable development and are becoming more active.

Most LAC countries have NDC targets under the Paris Agreement, typically ranging between 20-30% in terms of GHG reduction by 2025-2030 versus baseline levels.¹⁴ Brazil is among the most ambitious countries, with a 37% reduction target by 2025 and 43% by 2030 compared to 2005 levels.

Since 2012, the Brazilian Government and other key actors have developed several key green finance initiatives (see figure below for a summary of key policies and initiatives). All market participants have a role to play.



Institutional investors can play a critical role in scaling up domestic currency financing

Mobilising institutional investors – pension funds, insurance companies, sovereign wealth funds, hedge funds, mutual funds – is essential to promoting green finance. Doing so creates market liquidity and enables primary lenders to free up capital and make space for new lending and investments. Institutional investors can also play a critical role in scaling up domestic currency financing through direct lending or equity investment in large, long-term projects such as green infrastructure and property.

B3, the largest Brazilian stock exchange, has taken steps to grow responsible investment in recent years. Having joined the UN's Sustainable Stock Exchanges Initiative (SSE),

it offers a separate listing for green bonds and has several sustainability-related indices. Complementing this, in 2017, investors representing BRL1.8tn in assets, signed a joint Green Bonds Statement showing their support for green bonds, facilitated by CBI and the BGFI. BGFI represents approx. USD1trn in assets under management. Under this initiative, two green funds have been launched (one by BNDES in 2017 and one by BrasilPrev in 2019) and USD1bn issued for refinancing renewable energy portfolios.

Also, the Financial Innovation Laboratory (LAB) was launched by Brazil's Securities and Exchange Commission (CVM) and the Brazilian Development Association (ABDE) in collaboration with IDB. One of its cross-sector working groups aims to research, develop and pilot finance instruments to increase climate-related investment.¹⁵

Private companies can obtain upfront financing for green investments

Private companies and companies operating under a government concession framework can access debt capital markets to obtain upfront financing for green investments. These companies could therefore issue green bonds to secure the financing required for building the necessary infrastructure at the local level. Corporate bonds have accounted for most of Brazil's green bond market.

Infrastructure debentures are one of the most widely used financing instruments in Brazil. Compared to traditional bank lending, they can generally offer lower funding costs, longer maturity, better guarantee requirements, and more attractive returns to investors.

Since 2011, a new form of infrastructure debentures became even more popular in the Brazilian market: the incentivised debentures. Regulated by Law 12.431, incentivised infrastructure debentures exempt individual investors from paying income tax, being the reason why this product has become almost entirely absorbed by retail investors as an attractive form of investing in capital markets.

In March 2019, the Ministry of Economy proposed to create a fast track for infrastructure debentures (under Law 12.431/11) with social and environmental benefits. This decree could incentivize more projects with green benefits to fill in the country's infrastructure gap.¹⁶

Local banks are a key source of funding

Local banks can function as aggregators of green projects and refinance in the green bond market, or may be able to develop green securitisations, given their market expertise at a subnational and country level. This would provide indirect capital market access for small and medium-sized enterprises (SMEs), which cannot access debt capital markets directly due to limited project scale and lack of bond issuance expertise.

Green banks and dedicated green programs within banks can contribute to accelerating private sector participation in green projects by offering dedicated green products compliance with international definitions of 'green'. In the case of green bonds, bank lending is essential to cover the risk of infrastructure development during construction, while bonds provide a capital source for re-financing during the operation phase.

Green lending and other credit facilities are also important tools for growing green finance in Brazil. When provided by financial institutions, these facilities could function in the same way that traditional lending does, where the assets comprised in the loans or the projects being financed are eligible. The BNDES has pioneered a type of green lending, with the creation of LED lighting credit lines.

Local financial institutions, including development banks, can therefore expand on the concept of green lending to provide more favourable conditions to green projects and assets. Furthermore, by fostering the implementation of more green lending streams in banks, municipalities can benefit with the expanded borrowing capacity for companies to implement urban infrastructure services.

Brazilian development banks are well positioned to lead green finance

Development banks in Brazil include BNDES (the primary Federal source of development finance), Bank of the Northeast (BNB), Banco da Amazônia SA (BASA), Banco Regional de Desenvolvimento do Extremo Sul (BRDE) and Minas Gerais Development Bank (BDMG). National and subnational development banks in Brazil are well placed to be the link between sustainability and development.

They could issue green bonds and other financial products as well as to collect third party resources through term deposits and international financing. They could also aggregate portfolios of loans to green projects/ sectors, known as green tagging, and by refinancing green portfolios in the green bond market, expand their lending capacity, thus further benefitting municipalities and other public sector borrowers.

Domestic development banks can also provide special financing vehicles for green projects, such as with the BNDES Finame Renewable Energy line and Climate Fund Programme. The Finame Renewable Energy line, launched in 2018, is a permanent credit line to support investments in renewable energy, with an initial BRL2bn allocation.¹⁷ This fund was launched following the success of the Climate Fund Programme, established by Law 12,114/2009. It is one of the Climate Change National Policy's instruments, with the goal of financing climate change mitigation projects, using technologies that still need encouragement for their diffusion.

Also, in 2018, the Climate Fund Program - Efficient Machinery and Equipment Line was launched to finance investments in photovoltaic systems, allowing access to individuals. The result was successful: about BRL80m in funding was approved in less than two months. BNDES then topped up the fund, making additional contributions of BRL228m for new financing.¹⁸

BNB provides special instruments for infrastructure that could be considered green, via four key programs:



1. FNE Água

FNE Água finances up to the total value of projects for the efficient and sustainable use of water, with resources from the Northeast Constitutional Financing Fund (Fundo Constitucional de Financiamento do Nordeste - FNE).¹⁹



2. FNE Proinfra

FNE Proinfra aims to finance the acquisition of capital goods and implementation, modernization, renovation, relocation or expansion of enterprises. The sectors included in its framework are, energy, water infrastructure and basic sanitation, logistics and transportation, ICT, and natural gas (notably, gas is excluded from the Climate Bonds Taxonomy).²⁰



3. FNE Sol

FNE Sol can finance all components of micro and macro power generation from photovoltaic, wind, biomass or small hydroelectric sources, as well as their installation.²¹



4. FNE Verde

BNB's Financing Program for Environmental Sustainability finances the implementation, expansion or modernization of projects (except in cases impacting on native forest), aiming to promote projects and economic activities that foster environmental preservation, conservation and recovery.

Development Finance Institutions (DFIs) have a unique role to play

DFIs have a mandate to support developing countries and can achieve this through blended finance and credit enhancement mechanisms, reducing risk exposure and enhancing market incentives for investors to mobilize private capital. This is particularly relevant for large-scale projects such as infrastructure development, where the blended finance approach can generate more bankable project pipelines by providing technical support and facilitating access to funding.

DFI credit enhancement and risk sharing tools can include partial credit or risk guarantees, viability gap funding, special finance vehicles, first-loss provisions, contingent and A/B loans. These tools are increasingly being structured and implemented exclusively for green projects.

DFI's can also issue and invest in green bonds, used to support local green infrastructure. IDB has not yet issued a green bond; however, it has provided support for green bond issuance. For example, IDB supported along with CBI the Government of Chile with the preparation of documentation and necessary certification for the sovereign green bond issuance that took place in mid-2019.²²

In another case, in 2018, IDB Invest (the private sector institution of IDB) signed an agreement with BICE (Banco de Inversión y Comercio Exterior) of Argentina for the subscription of a USD30m sustainability bond. This deal is part of a wider trend of DFI's being sole investors or acting as bond structurers. DFIs can support "market creation" by participating in first-time issuances and helping new issuers get their names out to investors. Effectively, this establishes pricing points, the idea being that issuers return to market publicly.

As the green bonds market grows in Brazil and the LAC region, the role of IDB and other DFI's will evolve. The latest means of IDB support is the creation of a Green Bond Transparency Platform, with the support of a consortium of market stakeholders. This will support reporting levels by providing standardised and transparent disclosure. Although, Brazil is already amongst the top five countries in LAC by level of reporting.

In addition to providing direct green financing, as anchor investors in debt issuance or in IPOs, DFIs can leverage their support to attract other investors. They can help a company seeking funding to build investor confidence and catalyse investments from a wider pool of private actors (both international and domestic). They can also support initiatives like the IDB Financial Innovation Lab, which works to find new ways for growing green finance in the region.

IDB Financial Innovation Labs

Established in 2019, the IDB Financial Innovation Lab²³ provides a forum for the cultivation and exchange of ideas about financing techniques for climate change mitigation and adaptation investments with the goal of developing investment vehicles and financial structures that maximize private sector leverage and optimize the use of donor funds.²⁴

This was preceded by the Brazilian Financial Innovation Lab, which was launched in 2017 by IDB, Brazil's Securities and Exchange Commission (CVM) and the Brazilian Development Association (ABDE), aiming to develop Brazil's regulatory agenda. The multi-sector group gathers twice a year focused on the local green finance agenda.

Some of the financial tools considered by these initiatives include guarantees, blended loans, first loss structures, insurance vehicles, etc. This is in recognition that DFI's have a key role in de-risking rather than using public money for direct investing and therefore facilitating greater private sector involvement in green financing.

One of the initiatives created by the Lab, being implemented in Brazil, is the **Energy Savings Insurance (ESI)** program. ESI provides an insurance product covering projected energy savings for specifically defined and verifiable energy efficiency (EE) measures, with agreement between SMEs and energy efficiency services and technology providers.²⁵ Compensation is paid should promised EE savings not be realized.

IDB supports ESI initiatives through a blended finance approach. For example, in Colombia, IDB funding was blended with resources from the Clean Technology Fund to establish a concessional line of financing for private sector investment projects in EE.²⁶

The program has been recognised as an effective approach, with the Global Innovation Lab for Climate Finance endorsing it as one of the most promising instruments for mobilizing private sector investments in EE. Ideally it will make EE initiatives more attractive and result in a growing pipeline of EE projects. EE can be part of many types of green infrastructure projects and is an activity included in the CBI Taxonomy.

DFI instruments that could be used for green projects

DFI's can step in to provide the assurance structures working with private investors, who would contribute with the main capital expenditure for infrastructure investments. This can be done through an array of instruments, such as:

- **Cornerstone investments** - where a public entity buys (i.e. invests in) a large number of notes of a particular bond issue or quotas in a fund;
- **Structuring dedicated funds** - which prioritise sustainable infrastructure investments such as the Sustainable Energy Fund launched by BNDES;
- **Providing guarantees** - in the cases where a near-total private sector investment is feasible, but the lack of guarantees from the Brazilian government prevents finance flows;
- **Leveraging aggregation platforms** - in order to facilitate access for international investors seeking larger volumes, usually over 200m in hard currency. By supporting aggregation instruments such as financial securitizations, CRIs (Real Estate Receivables Certificates) and LIGs (Letra Imobiliária Garantida), it is possible to bundle a number of infrastructure investments and therefore access institutional capital; and,
- **Fostering innovative revenue streams, such as Land Value Capture (LVC)** - a new model in Brazil, where infrastructure investments trigger an increase in adjacent property values, which can be captured as part of the return on the infrastructure investment.

Infrastructure Private Financing Alternatives in Brazil

This section was developed in partnership with Pinheiro Neto Advogados.

Regulatory analysis and recommendations:

Authors: Ricardo S. Russo, Rodolfo F. Schreuders, Heloisa Figueiredo Ferraz

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Brazil has a huge demand for new infrastructure projects. For example, when we consider only the projects that have qualified for the Federal Government's Investment Partnership Programme (PPI), in addition to the 46 already ongoing projects, the PPI portfolio reached 59 new projects in May 2019. The expectation is that the new projects alone will attract BRL1.4tn in investments throughout the period the concession is in force.²⁷

The country lacks resources for a number of other infrastructure projects, which are not included in those mentioned above, such as universal access to basic sanitation. Therefore, there is a much higher need for resources to develop national infrastructure. This fact, combined with the current international macroeconomic environment, makes foreign, as well as domestic investors interested in participating and implementing such projects.

The Brazilian capital market, through income tax-free debentures, is an important private financing mechanism for infrastructure projects. From 2012 to halfway this year, the total amount distributed in infrastructure debentures was BRL60.5bn. Indeed, between January and July 2019, over BRL60.5bn was raised by income tax-free debentures for the national infrastructure.²⁸

In order to assist in the feasibility of infrastructure projects in Brazil, please find below some suggestions and summarised points that require attention:

(i) Tax-free Bonds. In order to promote greater participation of institutional investors (notably pension funds) in offers involving long-term income tax-free bonds (infrastructure debentures), the rules regarding procedures and timing for companies to become listed and publicly held could be updated and amended specially for companies that intend on issuing only debt securities (and not shares). In this way, such companies could take better advantage of market windows and attract a wider range of investors (some of them restricted vis-à-vis acquiring debt securities issued by privately held companies).

(ii) Fostering dialogue between the private sector and public sector bodies.

In addition to the efforts already seen at the scope of PPI, meetings and events should be sponsored to facilitate dialogue between the private initiative and the several bodies involved in an infrastructure project, particularly considering social and environmental variables. These difficulties in institutional dialogue can lead to significant project delays and increase the uncertainty level which translates into greater financial risk in terms of funding.

(iii) Resource disbursement deadlines.

Usually, a long-term project has different financing phases, with financing that involves capitalisation, bridge loans, long-term financing and tax-free debentures. Often, there are hiccups in matching resource disbursement deadlines with the concession's operational schedule. An alternative could be as follows: if a state-owned bank agrees to finance a project, other banks could take advantage of this, including access to materials/studies already used by the state-owned bank in its credit approval process (rather than starting a completely new credit approval process).

(iv) Foreign Investors. In order to attract foreign investors/financiers to infrastructure projects as a complementary source to BNDES, state-owned banks and capital markets, an alternative would be to create rules to minimise the income tax impact on foreign investors, on the interest rate instalment paid by local companies that issue bonds or notes in the international market, whose resources are namely allocated to infrastructure projects.

(v) Project guarantees. In addition to the usual collateral, equity support agreements (ESAs), corporate and bank guarantees, the creation of specific guarantee mechanisms as a way to mitigate project risks (notably those involving sub-national entities) could be considered. For example, the creation of collateral or credit insurance, or the use of existing structures for other sectors (like the existing export fostering structures – via local federal agencies namely ABGF/SAIN).

(vi) Foreign exchange hedge. A major concern for foreign investors is the risk of exchange rate variation, particularly in cases where project revenues are in the local national currency. For example, some situations where the public sector would take up part of the hedge contracting cost could be taken into consideration; or scenarios

where part of the concession signing bonus could be used for foreign exchange hedge, among other alternatives (which in fact, are being studied by the local executive branch).

(vii) Request for clarification in public bidding processes. We feel the need for shorter deadlines for replies from public organisations/government in relation to clarification requests vis-à-vis terms for bidding and auxiliary documents, sent by those taking part in the process. Many times, the replies to clarification requests are decisive for competitors to decide the best legal structure and/or financial modelling to use when submitting their bids.

(viii) Update of Law No. 12,431 / 2011 (law that created the local infrastructure debentures). Since being edited in 2011, the law has been through some important changes and now is an appropriate moment for its update, particularly in relation to: reviewing the qualifications of potential income tax-free bond issuers (not all are SPEs and/or dealers); expanding how debentures are remunerated; standardising ministerial framework ordinances; and inclusion of projects from infrastructure sectors other than those currently included.

(ix) Publishing of rules ensuring legal certainty for investors. For example, in the sanitation area, the granting of powers to the National Water Agency (ANA), to establish national rules for the rendering of basic sanitation services – mainly on quality and efficiency standards, utilities tariff regulation, standardisation of business instruments and regulatory accounting –, ensured better regulatory standards and, thus, greater legal certainty for potential investors in the industry.

(x) Possibility of private companies providing basic sanitation services. If Senate Bill No. 3261/2019 is passed, private companies will be able to sign concession contracts before a public bidding process, to provide basic sanitation services. Currently, the services are provided through programme contracts signed between management and state-owned companies.

Green infrastructure investment opportunities

The Brazilian government aims to develop billions of dollars of new public-works projects. Most major infrastructure projects in Brazil are listed on the government's Investment Partnership Program (PPI) online platform.²⁹ Although the platform does not specifically identify which projects are green, a high-level analysis against the CBI Taxonomy shows that, of the 95 projects listed, about 16% are potentially green projects.

Further research reveals that there are additional green infrastructure projects and assets of many different sizes and technologies spread across the nation. These range from a BRL12m waste to energy plant through to a BRL3.08bn metro rail project. A list of 57 projects has been compiled into a sample pipeline (see Annex VI).

This report uses the globally recognised Climate Bonds Taxonomy and Sector Criteria to determine which projects and assets are green. However, there are many other standards and schemes that can be used to measure the 'greenness' of projects in Brazil.

There are a number of bodies that have developed definitions and standards for green assets and infrastructure projects, internationally, in Latin America and in Brazil. Most of these apply to either the development and retrofitting of buildings or a broad set of infrastructure projects and assets. In LAC, there is the IDB's Sustainable Infrastructure Platform and, in Brazil, there are local 'green' standards for buildings and tourism activities, but not for infrastructure.

Other international standards that are applicable in Brazil, include the effective

energy management systems (EnMS)/ ISO 50001; ISO 14064/ABNT NBR ISO 14064:2007; GRESB Infrastructure ESG Benchmark; Standard for Sustainable and Resilient Infrastructure (SuRe); and, Envision (see Annex V for more details).

Investors currently have too few tools to ensure that their investments are making a significant impact. Having common definitions of 'green' across global markets, allows investors, potential issuers and policy makers to identify green assets and attract investment more easily.

Ideally, the Brazilian government could adopt a best practice standard to identify green projects in the list of PPI projects. Then it can prioritise projects that are in line with international definitions for 'green' and provide clear 'green' labelling, when preparing future infrastructure pipelines.

Providing this level of visibility for green infrastructure investment opportunities could facilitate increased access to private sector capital for Brazil's economic development, the acceleration of Brazil's transition to a low carbon economy, and help meet global institutional investor demand for green assets.

Methodology

The following section explores green infrastructure investment opportunities across Brazil in four key sectors: renewable energy, low carbon transport, sustainable water management and sustainable waste management. Although not included here, Brazil has a substantial green project pipeline

across other sectors like green buildings, agriculture/ forestry, and tourism.

The following filters were applied to the key sectors:

- transport projects valued above BRL50m
- energy generation facilities above 50 MW
- water projects valued above BRL50m
- waste projects valued above BRL10m

There are various ways for an investor to gain exposure to a specific project, asset or portfolio. The possible investment pathways will vary depending on the asset ownership structure, the stage in the asset's financing lifecycle, and the investor's mandate. This can vary between projects with public and private funding.

Accordingly, further metrics were used to classify the green infrastructure investment opportunities, by status:

- Completed projects: high profile, recently completed projects;
- Projects under construction: major projects that are under construction; and
- Planned projects: major projects that have not yet begun construction but have been announced and/or have undergone business case planning and/or have been allocated budget.

Case studies and a sample pipeline have been developed for this report to show the different types of opportunities available in the short- and medium-term future in Brazil. The case studies include both greenfield and brownfield projects and assets that could have been or could potentially be financed/ refinanced via green bonds.

The IDB Sustainable Infrastructure Platform

IDB's Sustainable Infrastructure Platform presents an opportunity for Brazil to access a more locally relevant standard. It is a framework of sustainability criteria that covers an integrated spectrum of economic, financial, environmental, social, and institutional dimensions for infrastructure projects.

The framework addresses three key stages of infrastructure delivery: policy and planning (or upstream level), project preparation and design, and financing. It consolidates the fundamental environmental, social, institutional, economic, and financial principles for implementing sustainable infrastructure investments and is applicable throughout the entire project cycle and across different sectors and regions.³⁰

Green buildings

Globally, the building sector has the largest potential to significantly reduce greenhouse gas emissions compared to other major emitting sectors. Building and construction alone account for nearly 40% of energy related CO₂ emissions.³¹

Brazil is already an established green building market; it is South America's largest green-certified building market with over 1,400 green buildings and projects. Office and retail currently lead the market for green building certification, but the projected high urbanization rate would mean generating greater growth opportunities for green residential building.³²

The key standards that apply in Brazil for green buildings include global standards: LEED, EDGE, GRESB, and local standards: Selo Casa Azul (Blue House Seal) as well as the GBC Casa & Condominio. The

Casa Azul Seal is a socio-environmental classification of housing projects financed by Brazilian bank Caixa Econômica Federal. It is granted to projects that comply with at least 19 mandatory criteria out of 53.³³

The GBC Casa & Condominio is a certification rating tool for the residential sector, developed and administered by the Green Building Council Brasil, and based on LEED and Selo Azul da Caixa.³⁴ It has certification in eight categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials and Resources, Indoor Environment Quality, Social Credits, Project & Innovation, and Regional Credits.

The increasing rate of urbanization is likely to set greater demand and needs for Brazil green building. Brazil is expected to have a steady growth with green buildings in the future.³⁵

What's green?



Geothermal:



According to the Geothermal Energy Association, 39 countries could supply 100% of their electricity needs from geothermal energy, yet only 6% to 7% of the world's potential geothermal power has been tapped.³⁶

Drawdown Agenda

Solar:

The world installed a record number of new solar power projects in 2017, more than net additions of coal, gas and nuclear plants put together.³⁸

UNFCCC

Hydropower:



Hydropower is the largest source of renewable electricity in the world, producing around 17% of the world's electricity from over 1 200 GW of installed capacity, and is expected to remain the world's largest source of renewable electricity generation by 2022.³⁷

International Energy Agency



Transport (rail):



75% of the world's countries have established strategies and targets to improve the environmental performance of their transport sector within their Intended Nationally Determined Contributions (INDCs). One-fifth of the transport-related (I)NDCs include measures in the railway sector.³⁹

UNFCCC

Water:



The UN says the planet is facing a 40% shortfall in water supply by 2030, unless the world dramatically improves the management of this precious resource.⁴⁰

UNFCCC

Buildings:



Building-related emissions account for about one-third of global GHG emissions and could double by 2050, making building efficiency a critical part of the COP21 agenda.⁴¹

GreenBiz

Low carbon transport

Transportation modes and ancillary infrastructure that produce low or zero direct carbon emissions. This can include national and urban passenger rail and freight rail networks; Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.

Sector overview

Estimates show that Brazil has a USD209bn climate-smart investment potential in urban transport infrastructure by 2020.⁴² The transportation sector needs to lower its carbon footprint, as transportation, alongside manufacturing, are the main sectors responsible for GHG emissions in Brazil.⁴³ The sector also needs to adapt to the challenge of rapid population growth and urbanization, which will pose a significant mobility challenge in urban areas in the future.⁴⁴

The government needs to expand and improve its public mass-transit systems and freight rail to reduce GHG emissions, as roads are still the predominant transportation infrastructure in Brazil. Currently, the proportion of road-based transportation accounts for 61% of national cargo traffic.⁴⁵ Despite the fact that there is a uniquely large proportion of cars and trucks in Brazil using biofuel (around 20% in 2016 - higher than any other member country of the International Energy Agency), motor vehicles remain a significant source of GHG emissions.

The low carbon transport opportunities in Brazil include rail (passenger and freight), mass-transit systems (including metro, light rail and bus rapid transit) as well as the upgrade of road lighting systems, and the adoption of electric vehicles (EVs).

The Federal Government is currently showcasing one of the largest infrastructure concessions portfolios, under which over BRL64bn in rail investments is foreseen, promoting a modal shift for logistics in the country. Brazil began responding to the mobility challenges in 2012 by approving the National Urban Mobility Policy, which prioritizes non-motorized over motorized transport and collective over individual modes of transport.⁴⁶ This policy opened the pathway for further private sector involvement, and provides a pipeline of investment opportunities for the next few years in Brazil.⁴⁷

The electrification of transport systems will see a particularly steep rise in demand in Brazil over the coming years. The National Electricity Regulator (ANEEL) has issued regulation on the provision of charging services for EVs, with 2025 set as the deadline for EVs to surpass internal combustion engines, in terms of economic competitiveness, as estimated by industry associations and manufacturers. With the increase in the production of biofuels, an expansion of biofuel/electric hybrids is also a reality and could replace mass-transit vehicles in the short term.

Funding options and investment pathways

Many funding structures are available to encourage private sector involvement in the long-term financing required for low carbon transport projects, including green bonds, outright asset acquisitions, public private partnerships (PPPs) and the securitisation of green assets.

Green bonds provide indirect exposure for investors to specific projects and assets and provides attractive credit and liquidity credentials for institutional investors. Klabin, Brazil's leading manufacturer of packaging paper and board, issued a green bond in 2018 and used its proceeds to partly finance a 21km rail branch. Within the transportation sector, potential climate-aligned issuers in Brazil are freight and logistics companies MRS Logística, Concessao Metroviaria do Rio, Rumo Logística Operadora Multimodal, and SuperVia Concessionaria de Transporte Ferroviario.

Government-backed concessional loans are a new structure which provides greater leverage against the revenue streams of transport (i.e. fares). Another innovative mechanism is 'value capture', which refers to the value that is generated for private landowners from infrastructure and surrounding business operations. As private sector appetite increases, funding sources will continue to diversify, and investment will accelerate.

Freight rail in central Brazil

Title: EF-354 Ferrovia de Integração Centro-Oeste^{48,49}

Proponent: Investment Partnership Program (PPI)

Location: Goiás and Mato Grosso

Status: Planned. Project studies are being finalized and construction is dependent on the extension of the EFVM railway concession.

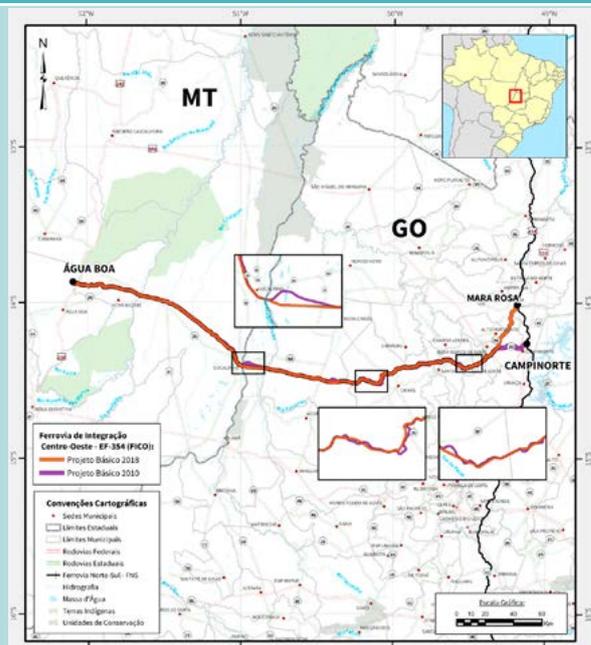
Classification: Transport, freight rail, infrastructure

Cost: BRL2.7bn

Financial structure: Concession

Description: The project includes the construction of 383km of rail to connect Campinorte in the state of Goiás to Água Boa in the State of Mato Grosso. It will transport grains (soy and corn) to major ports in Brazil.

Output: The expansion of the EF-354 will improve logistics for agriculture products; improve market access (domestic and international); favour multimodal transport in the country; and, decrease the cost of freight and GHG emissions.



São Paulo metro

Title: Line 08 Diamante and Line 09 Esmeralda de Trens metropolitanos (CTPM)^{51,52,53}

Proponent: São Paulo State Government

Location: São Paulo

Status: Planned. A public hearing to be held on the concessions in November 2019 and bidding instruments to be published in December. The call for bids to be published in Q1, 2020.

Classification: Transport, public passenger transport, trains/ infrastructure

Cost: BRL3.08bn

Financial structure: Concession

Description: Operation, conservation, maintenance and modernization of existing installations, including the construction of new stations currently operated by CPTM. Line 8 Diamante (Julio Prestes-Amador Bueno) has 35km and 22 stations, transporting approx. 478,000 passengers/day. Expectation is to increase capacity to 530,000 passengers/day. While, Line 9 Esmeralda (Osasco-Varginha) has 32km and 18 stations, transporting approx. 573,000 passengers/day. Expectation is to increase capacity to 611,000 passengers/day.



Output: Improvements to urban mobility, decrease of commuting time and interval between trains, modernization of infrastructure (e.g. electric systems), introduction of communications-based train control on Line 8.

Light rail in Piauí

Title: Modernization of the Teresina Metro^{55,56,57,58,59}

Proponent: Piauí State Government

Location: Piauí

Status: Under construction

Classification: Transport, public passenger transport, trains/ infrastructure

Cost: BRL450m

Financial structure: Public Investment (Resources from Orçamento Geral da União)⁶⁰ / Caixa Economica Federal⁶¹

Description: The modernization of the city of Teresina's metro system includes three Light Rail Vehicles (LRVs), improvements to the whole metro line and nine stations (Matinha, Ilhotas, Renascença, Itararé, Frei Serafim, Piçarra, Boa Esperança, Parque Ideal and Dirceu II), the construction of two new stations (Sao Joao and Mafua), duplication of existing lines, the construction of a new bridge on the Poti River and the construction of an Operational Control Centre.



Output: Improve urban mobility in the city (the three LRVs have the capacity to transport 1,800 passengers per trip) and, in the longer term, in the state. There is the ambition of expanding the metro system to other cities in Northern Piauí.



Renewable energy

Energy generation, transmission or storage technology that has low or zero carbon emissions. This can include solar energy, wind energy, bioenergy, hydropower, geothermal energy, marine energy or any other renewable energy source.

Sector overview

Nearly 83% of Brazil's energy mix comes from renewable energy sources including water, wind, biomass and solar.⁶² Hydropower currently dominates the mix of renewable energy (64% in 2018), but recent episodes of severe drought have created strong incentives to diversify the country's renewable energy mix.⁶³ This diversification is consistent with Brazil's long-term climate change plan to expand the use of renewable energy sources other than hydropower in the total energy mix to between 28% and 33% by 2030.⁶⁴ The government is planning to achieve this goal by raising the share of wind, biomass and solar.

Currently, solar energy only accounts for 0.5% and wind 7.6% of the electricity mix, but installed capacity is projected to rise.⁶⁵ The Government's latest plan on solar energy – the Plano Decenal de Expansão de Energia (PDEE) 2027—focuses on significantly increasing solar photovoltaic (PV) capacity.⁶⁶ While Abeeólica Brazil's wind energy association predicted that installed wind energy capacity would rise by nearly another quarter this year compared to 2016 to 13,350 MW and 17,978 MW by 2020.⁶⁷

Brazil is already a large producer and consumer of bioenergy. Biomass represents half of fuel and heat consumption, and sources about 8.7% share of the renewable energy in Brazil.⁶⁸ Brazil's NDC stated that the Brazilian government is planning to increase this share from 9.2% in 2018 to 18% by 2030. In 2017, Brazil's national bioenergy plan, known as RenovaBio, was launched. The main goal of RenovaBio is to promote the adequate expansion of biofuels in Brazil's overall energy matrix.⁶⁹

Funding options and investment pathways

The BNDES has funded over 70% of Brazil's renewable energy projects.⁷⁰ BNDES also plays a significant role in structuring financial mechanisms to enable the entry of the private sector into long-term financing. The government is also encouraging private sector participation; the Brazil Free Energy Market legislation incentivizes private participation in the market.

An example of a private sector participant is Engie, the largest private energy producer in Brazil, which has invested more than BRL7bn in new renewable energy blueprints during the last three years.⁷¹ While state-owned companies (such as Eletrobras, Cemig and Copel) have reduced their investments in the energy-sector by 45%, eight out of eleven private companies have increased their investments up to 200% between 2016 and 2018.⁷²

Renewable energy project developers and asset owners should have access to a variety of funding options from banks, specialised project financiers, debt clubs, investment funds, direct investors and the capital markets. Green bonds are very well suited to large renewable energy projects or asset portfolios and can be structured in a number of ways, including project bonds, corporate bonds, covered bonds or ABS. Aggregation of smaller projects can be done through securitisation or by banks originating green loans and refinancing in the green bond market. Green bonds issued for renewable energy include the BNDES USD1bn bond which sought to refinance the bank's solar and wind portfolios and finance new renewables projects.

Renewable energy funds are being used to support greenfield projects and stimulate innovation. In 2017, BNDES launched the BRL500m Sustainable Energy Fund, structured to acquire renewable energy debentures carrying a green label. Another example is the Climate Fund, also established by BNDES, which is dedicated to climate related projects and is one of the instruments of the National Policy on Climate Change that supports projects or studies and financing of projects that aim to mitigate climate change. The Climate fund – Finame Renewable Energy – is BNDES's second initiative to encourage investment in clean energy.⁷³

Solar power in Bahia

Title: Sao Pedro Solar Plant⁷⁴

Proponent: Atlas Renewable Energy

Location: Bahia

Status: Under construction, with power generation expected at the end of 2020

Classification: Energy, solar PV generation facilities

Cost: BRL244.4m⁷⁵

Financial structure: Funded by Banco do Nordeste (BNB) and with commercial banking guarantees from BTG Pactual, Banco ABC Brasil and Banco Bradesco.

Description: The Planta Solar São Pedro is in Bom Jesus da Lapa, in the State of Bahia. The project was granted in 2015 through the 7th Reserve Energy Auction and became operational in 2018. It was built on 146.6 hectares and is composed of 204,120 PV panels.



Output: The project produces 67.1 MWp of renewable energy, enough to power 82,000 homes. According to Atlas Renewable Energy, the project has avoided 61,125 tons of CO2.

Bioenergy generation in Tocantins

Title: Pedro Afonso Plant^{87,88}

Proponent: Bunge

Location: Tocantins

Status: Completed

Classification: Energy, bioenergy, facilities producing liquid biofuel, solid and gaseous biomass for heating and cogeneration

Cost: BRL600m

Financial structure: 80% of the funding was provided by Bunge and 20% by Japanese trading Itochu.

Description: Bunge's first greenfield unit in Brazil is located on 94 hectares in the rural zone of Pedro Afonso. The plant was inaugurated in 2011 with an initial milling capacity of 2.5 million tons of sugarcane per crop and 100% mechanized planting and harvesting. It produces ethanol and electricity through cogeneration.



Output: The plant has a milling capacity of 2.5 million tons per crop and has an installed capacity of 80 MW, with more than half going to the national grid.

Wind power planned for Rio Grande do Norte

Title: Gameleira Wind Complex^{77,78,79,80,81,82}

Proponent: CPFL Renováveis

Location: Rio Grande do Norte

Status: Planned - construction should begin by the end of 2019/ beginning of 2020 and the plant is scheduled to come online in 2024.

Classification: Energy, wind, generation facilities/ infrastructure

Cost: BRL350m

Financial structure: The financial structure of the Gameleira Wind Complex is yet to be finalised.⁸³ CPFL Renovaveis is a listed company that normally structures its projects through debenture issuance, development banks (e.g. BNDES and BNB) and commercial banks (e.g. Bradesco, Itau, Santander) - as project finance or corporate finance.⁸⁴ In 2016, the company issued a certified green bond, making it the first Certified Climate Bond issuer in South America.⁸⁵

Description: The Gameleira Wind Complex is composed of the Costa das Dunas (23.1 MW), Figueira Branca (10.5 MW), Farol de Touros (21 MW) and Gameleira farms (14.7 MW), in the State of Rio Grande do Norte. The 69.3 MW that the complex will generate was sold in the A-6 New Energy Auction, in 2018 for BRL89.89 /MWh.

Output: The project will generate 69.3 MW of renewable power.





Sustainable water management

Assets that do not increase greenhouse gas emissions or that aim at emission reductions over the operational lifetime of the asset, address adaptation, and increase the resilience of surrounding environments. This covers built as well as nature based water infrastructure.

Water management projects could include water capture and collection, water storage, water treatment (with methane emissions treatment), flood defence, drought defence, stormwater management, and ecological restoration/management.

Sector overview

Nearly 35 million people in Brazil do not have access to drinking water and, due to leakages, poor management and theft, the water system has a leakage rate of 37%, costing approx. BRL8bn.⁹⁰ Brazil has a vision of achieving 99% coverage of safely managed water supply and 92% access to safely managed sanitation services by 2033.⁹¹ The Federal Government National Sanitation Plan (Plansab), launched in 2013, is consistent with Brazil's water supply and sanitation vision. Plansab is aimed at setting plans for municipalities to achieve the universalization of sanitation service by 2033.⁹²

In 2017, the Brazil government estimated that it will require at least an average expenditure of USD6.1bn per year to achieve the water and sanitation sustainable development targets. The federal budget covers up to 95% of financeable water related items, recently increased from 80%,⁹³ but in practice a substantial gap remains. Currently, there is a financing gap of approximately at USD1.9bn to achieve the 2033 goal.⁹⁴

The water infrastructure in most need of investment includes facilities related to rural and urban sanitation and hygiene. Accordingly, opportunities exist for the private sector to enter and contribute in closing the financing gap.

Funding options and investment pathways

Currently, the sector is mostly supported by public finance. Specifically, water sector projects are primarily funded by federal funding, through the Brazil development bank or Brazilian constitutional fund. There is also regional funding from institutions such as the FNE Água in Northeast Brazil.

Green bonds could complement the funding of public water infrastructure. In 2017, only 9.7% of the green bond use of proceeds went to the water and sanitation sector in Brazil. This share corresponds to Klabin's issuance in September 2017, which financed multiple projects within the company's forest management strategy,

including water resources. Issuance in the water sector is small compared to the other green bond sectors such as transport and renewable energy.

Further investment pathways exist in the construction, ownership and refinancing of new types of infrastructure such as water desalination assets in the semi-arid region of Brazil, especially in low income communities which can profit from groundwater desalination, commercial and industrial water infrastructure, reclaimed water systems and integrating the national water safety plan.

According to views collated from the GRI Infrastructure Club in Brazil, investors are sending a positive signal in expanding their business in the water and sanitation sector.⁹⁵ Particularly as the water infrastructure in Brazil is estimated to have a high investment returns of up to 70%.⁹⁶

Historically, significant participation of national public funding structures and regulatory constraints have facilitated state-owned companies to control the provision of this public service, current private sector involvement is low, comprising less than 5% of Brazilian water infrastructure municipality contracts. The existing contracts typically are in the form of full or partial concessions and PPPs.

Nonetheless, a bill proposal (PL 3.261/2019), running in the Congress aims on updating Brazil's Regulatory Framework for sanitation, which could stimulate private investment in the sector.

Water reuse in Sao Paulo

Title: Capivari II Water Reuse Production Plant⁹⁷

Proponent: Campinas Water and Sanitation Company (SANASA)

Location: Sao Paulo

Status: Completed

Classification: Water, water treatment

Cost: BRL109m

Financial structure: Growth Acceleration Program (PAC), Caixa Economica Federal and SANASA⁹⁸

Description: The Capivari II Plant is in the city of Campinas, in the state of Sao Paulo. It was commissioned in 2012 and uses an ultrafiltration membrane system (MBR) – with around 36,000m²; the first large-scale MBR in Latin America. The plant benefits 317,000 people.

Output: Capacity of treating 360 litres per second.



Water distribution in Paraíba

Title: Transparaíba Adductor System^{100,101,102,103}

Proponent: Companhia de Água e Esgotos da Paraíba (Cagepa)

Location: Paraíba

Status: Phase 1 - Under Construction (Curimatau). The Cariri Branch is scheduled for construction from 2019 to 2024.

Classification: Water, water distribution

Cost: BRL195,5m

Financial structure: World Bank loan

Description: The Transparaíba adduction system (Curimatau branch) is part of the Brazilian Government's National Plan for Hydro-Security. 65km of the 186,000km of the abductor system has been built. The project is composed of a raw water pumping station, a treatment plant, seven treated water pumping stations, 18 individual system reservoirs, eight supporting reservoirs (suction wells), a reservoir for filter washing, four supporting and elevated tanks.



Source: www.cagepa.pb.gov.br/04

Output: The project will have the capacity to treat 578.37 litres of water per second and will improve access to water and the reliability of water services. The Transparaíba system aims to supply 19 municipalities, benefiting 148,000 people.

Desalination Plant for Fortaleza

Title: Desalination Plant for the Metropolitan Region of Fortaleza^{105,106}

Proponent: Companhia de Água e Esgoto do Ceará (Cagece)

Location: Ceara

Status: Planned

Classification: Water, water treatment and distribution

Cost: BRL3bn

Financial structure: PPP

Description: Construction, operation and maintenance of a desalination plant for the Metropolitan Region of Fortaleza. The plant should be built in the Mucuripe area, close to the Fortaleza Port. The operation of the plant is expected to commence in 2020.

Output: Capacity to generate 1000 litres of water per second. This represents approx. 12% of Fortaleza's Metropolitan Region Consumption and will benefit 720,000 people.



Source: www.diariconordeste.verdesmares.com.br/07



Sustainable waste management

The efficient use of resources to cut down on waste production, coupled with collection and disposal systems that promote reuse and recycle, thereby minimising residual waste going into waste to energy facilities. Where waste must go to landfill, there are gas capture systems installed to minimise emissions as well as measures to minimise run-off and other negative impacts on surrounding environments.

Sector overview

In 2017, Brazil produced 78.4 million tons of municipal solid waste, 6.9 million tons of which was disposed of in unknown places and 40.9% of which was sent to landfills without environmental protection mechanisms.¹⁰⁸ As a potential source of emissions, it is important that waste management methods are sustainable. An estimated BRL11,6bn per year (approx. USD3bn) in infrastructure investments until 2031 is needed to ensure universal sustainable waste management.

The National Solid Waste Policy (NSWP) law, established in August 2010, is a hallmark in Brazil's progress in achieving sustainable waste management system. The law required all municipal governments to submit a basic waste management plan and implement a holistic municipal waste management system that includes waste reduction, recycling, and improving waste-to-energy production. So far 40% of the necessary landfills have been rolled out and

this new policy presents an opportunity to ensure that new waste management systems are sustainable and maximise materials and energy recovery.¹⁰⁹

However, the country did not achieve the policy's requirements by the predetermined deadlines: 2012 and 2014. According to ABREN, (Associação Brasileira de Recuperação Energética de Resíduos) – the Brazilian Waste-to-Energy Association, among the difficulties in implementing projects are the lack of public technical capacity, access to project guarantees and a more holistic regulation considering, for instance, adequate fees for services and energy output commercialization. Another challenge relates to public financing: municipalities must operate within current fiscal regulations, limiting their ability to fund infrastructure projects. Sustainable waste management and energy sales could offer a regular source of revenue for discretionary capital projects.

The private sector could play a significant role in achieving this goal, while addressing the current investment and technical challenges that Brazilian municipal government are facing.¹¹⁰ ABRELPE – Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais – a Brazilian association that works with the public and private sector in solid waste management – has indicated that private sector engagement with the association has been a growing, especially in the sector of solid waste collection.¹¹¹

There is a particular interest from both the private and public sector for the further development of waste-to-energy (WtE) facilities. Investing in WtE facilities can yield

both environmental and financial benefits. WtE electricity production is considered low-emissions technology when the waste used has been sorted and does not include plastics or metals. These facilities can mitigate GHG emissions by generating energy from landfill gas; reducing waste; and promoting reuse/recycling practices. They also create new revenue streams (or savings) for municipalities as they sell off excess energy into the grid.

Funding options and investment pathways

Most of the major waste management assets and projects in Brazil are publicly owned, with public financing used primarily for waste treatment facilities, WtE processing and sanitary landfill infrastructure. Development banks, such as Minas Gerais, provide access to credit lines for municipalities and concessionaires.

Development via PPPs could offer options for municipalities to fund projects via green bonds, given that regulatory restrictions and capital constraints (addressed by Law 101/00) imposes limitations to local entities in accessing capital markets.

Privately owned asset and projects, which include recycling facilities and some WtE facilities, offer other means of debt and equity investment.

Accordingly, investment pathways could include participation in green bonds and consortium debt arrangements and/or equity stakes in individual projects via PPPs or other public-private or private ownership and financing structures.

Waste to energy plant in Maranhão

Title: Rosario Biogas Plant^{112,113}

Proponent: FENC Nordeste

Location: Maranhão

Status: Under construction

Classification: Waste, waste to energy

Cost: BRL12m

Financial structure: ENC Energy Brasil, GEF Capital and the Nordeste III Investment Fund

Description: Two plants of 1 MW each to be installed in the Rosario Landfill, in Maranhão. The land fill receives 1,100 tons of trash per day. The power will be sold to companies, with a discount of 10% to 20%.

Output: The plants will produce a total of 2 MW of power.



Source: www.vincipartners.com

Waste to energy plant in Parana

Title: Entre Rios do Oeste Biogas Plant^{115,116,117}

Proponent: FEntre Rios do Oeste Municipality, Cibiogas, Itaipu Technology Park and Companhia Paranaense de Energia (Copel)

Location: Parana

Status: Completed

Classification: Waste, waste to energy

Cost: BRL17m

Financial structure: Copel (as part of ANEEL's - Brazilian Electricity Regulatory Agency R&D Program)

Description: The pilot project will produce 250 MWh per month. In its first phase, 18 producers will supply 215 tons of manure from 40,000 pigs - to be processed by anaerobic digestion facilities.

Output: The project produces 250 MWh of energy per month, which will be used to power 72 public buildings in the municipalities - representing a 3% to 12% in the municipality's budget.



Waste to energy plant in Minas Gerais

Title: Boa Esperanca Plant^{119,120,121,122,123}

Proponent: Furnas Centrais Elétricas

Location: Minas Gerais

Status: Under Construction - 75% concluded, expected to be operational in October 2019

Classification: Waste, waste to energy

Cost: BRL32m

Financial structure: Furnas (as part of ANEEL's - Brazilian Electricity Regulatory Agency R&D Program)

Description: The Boa Esperança Plant is being built in a plot of 7,800 m², close to the municipality's landfill, with a capacity of processing 47 tons of waste per day. The first tests for this pilot project were held in February 2019 and its construction began in April 2019. It will use 100% national gasification technology.

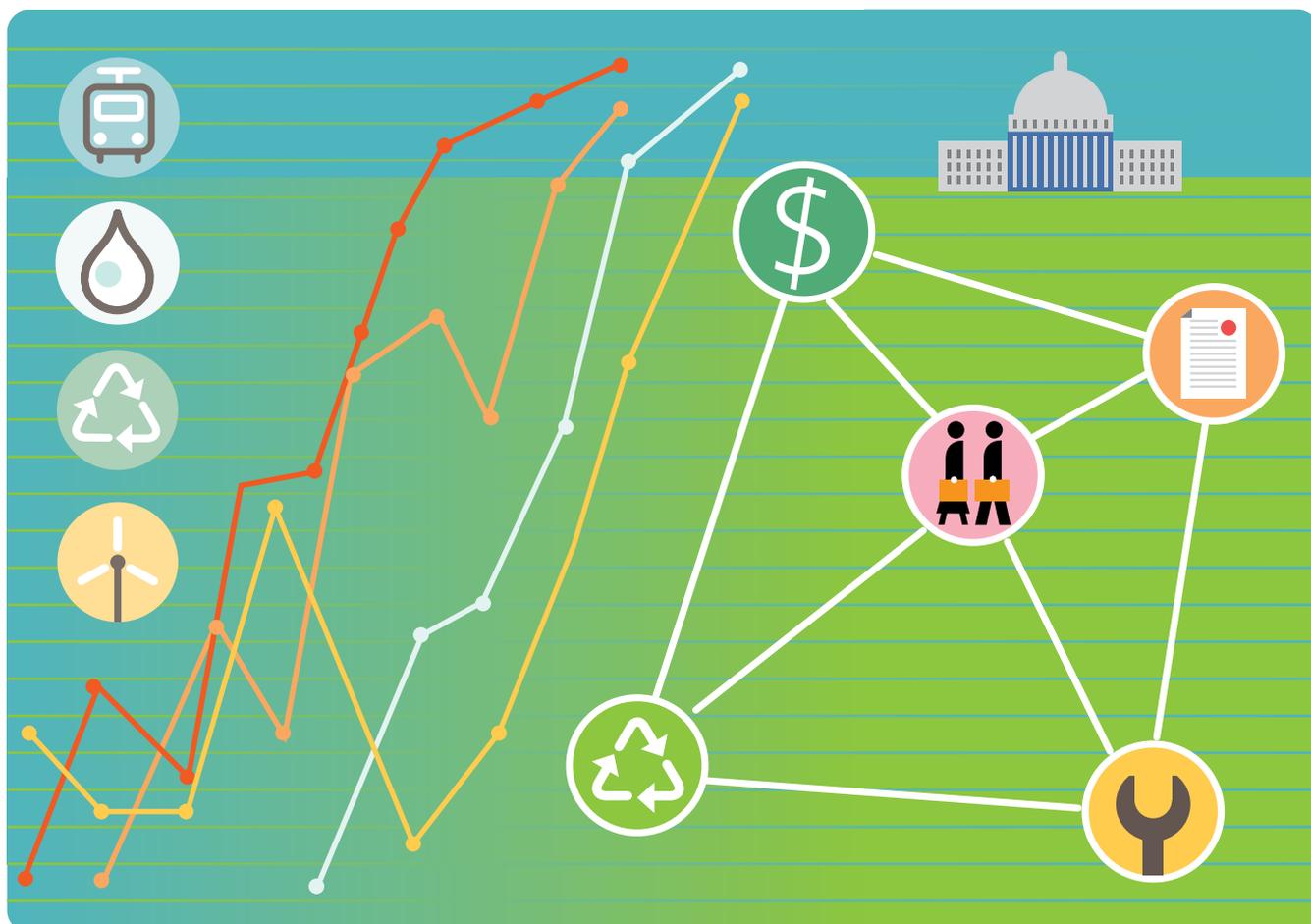
Output: The project will generate 1 MW of power. This value is equivalent to 35% of Boa Esperança's energy consumption.



Measures for growing green infrastructure

The growth of green infrastructure pipelines and associated green finance (including the green bond market) in Brazil can be aided by key policy and institutional changes. Such measures act to raise the profile of green infrastructure, support critical finance channels for infrastructure development stakeholders, diversify risks and create more options for investors. Key measures for doing so are as follows:

- Incorporate climate risk assessment in new infrastructure plans** through assimilating green taxonomy indicators, accounting for future depreciation of assets due to change in precipitation patterns, temperature increases and extreme weather events.
- Employ project preparation tools** for sustainable public infrastructure projects through good governance and technical assistance platforms, such as SOURCE.
- Employ, at the federal level, prioritization methodologies** and tools for the implementation of sustainable projects.
- Improve the visibility of the green investment opportunities** to help investors understand that there is a sufficiently large pool of financially attractive investments that are also green.
- Integrate climate resilience into the Investments Partnerships Programme (PPI) portfolio.** The government's program incentivises the partnership between public and private sector players as well as the privatisation of public infrastructure. Integrating climate resilience into its portfolio will accelerate the delivery of infrastructure for climate risks mitigation.
- Include climate resilience as a further priority sector in COFIEX's list of themes** for granting municipalities easier access to external finance.
- Adjust regulatory requirements,** including the promotion of a standardized green tagging approach for project finance and integration of climate criteria.
- Issue a sovereign green bond,** to send a strong signal to the market.
- Prioritise green infrastructure debentures issuance.** They are currently more appealing to investors, since the Brazilian government is granting fiscal incentives to the investors for this debt instrument.
- Partner with development entities,** moving beyond loans, to leverage and reduce the risk of infrastructure projects and attract a wider range of investors. For example, through the development of FX products, political coverage and credit enhancement products or offering credit guarantees and adopting a blended-finance approach in order to channel capital flows – possibly in combination with credit support to improve the bankability of projects.
- Promote climate-related financial risks disclosure** – e.g. supporting the implementation of recommendations of the Task Force for Climate-related Financial Disclosure (TCFD) – to boost investor confidence in the market.



Annex I: Green debt instruments applicable in Brazil

Debt instruments	Use of proceeds	Rating	Instrument available in Brazil	Examples
Supra-Nationals and Sovereigns	Proceeds are allocated to nominated projects, assets or international federal reserve accounts	Debt securities carry the credit rating of the issuing State. However, an independent rating may be assigned by ratings agencies.	Títulos do Tesouro and Títulos Públicos Federais	<p>The Central American Bank of Economic Integration (CABEI) issued a supra-national of ZAR1bn (USD74m) for supporting energy efficiency, renewables and power infrastructure projects.</p> <p>Chile issued USD1.4bn sovereign green bond to finance green infrastructure projects, followed by another EUR861m (USD978m) issuance for financing activities of energy efficiency, renewable energy, water management, clean transportation, green buildings, living natural resources and land use and marine protected areas.</p> <p>No sovereign green bonds have been issued by Brazil.</p>
Green state treasury and municipal bonds (sub-sovereign green bonds)	Proceeds are allocated to nominated projects and assets within the sponsoring region.	Credit rating is based on that of the issuing municipality and the credit quality of the underlying assets.	Títulos Públicos***	<p>Local governments in Argentina have issued three green bonds. The Province la Rioja is a repeated issuer, with two sub-sovereigns of USD100m and USD200m for wind projects. The Province of Jujuy issued USD210m for completing the financing of a solar project.</p> <p>No green treasury and municipal bond issued from Brazilian entities due to fiscal constraints, sub-sovereign entities have been unable to issue debt.***</p>
General obligation green bond	Proceeds are allocated on nominated projects and assets.	As the green bonds are backed by balance sheet assets, the bond will carry the credit rating of the issuing entity.	CDB (Bank Certificate Deposit - a type fixed income bond offered by banks. In practice, investors lend money to the bank, which pays them with interest), LCI and LCA (Respectively, Real Estate Notes and Agribusiness Notes which are backed on loans and financing made by financial institutions on the respective sectors), Debentures (regulated by CVM 400* or CVM 476**) and Incentivized Debentures as laid down by Law 12.431/10	<p>BNDES has issued sub-sovereign Green bond in the amount of USD1bn for financing environmentally sustainable projects, certified by a company specialized in the environmental area.</p> <p>AES Tietê Energia has issued BRL820m (USD205m) in green corporate debentures for financing and refinancing the acquisition of 8 solar farms with a total capacity of 225MW.</p>
Green securitisation or green tranches in ABS and MBS deals	Proceeds are allocated on nominated projects and assets.	Debt securities backed by a pool of underlying assets; an independent credit rating is issued by a rating agency.	CRA (Agribusiness Credit Receivables Certificates) ; CRI (Real Estate Receivables Certificate)	Suzano Papel e Celulose S.A. has issued a Green CRA in the amount of BRL1bn (USD250m) for investing in reforestation, expansion of certified forests and renewable energy.

Debt instruments	Use of proceeds	Rating	Instrument available in Brazil	Examples
Green structured finance	Proceeds are allocated on nominated projects and assets.	Debt securities backed by a pool of underlying assets; an independent credit rating is issued by a rating agency.	FIDCs with mezzanine, senior and junior quotas.	Uruguayan Atlas Renewable Energy used an A/B bond structure including a senior and a subordinated note tranches with IDB Invest as the lender of record. The deal was privately placed with bond investors and IDB Invest. The USD114.4m deal financed solar energy projects. No green structured finance issued yet from Brazil .
Green project bond	Proceeds are allocated on nominated projects and assets.	Credit rating is based on the quality of the backing green assets and the returns stream of the underlying project.	Incentivized Infrastructure Debentures (Project Debentures laid down by Law 12.431/2010. and regulated by CVM 400* or CVM 476**)	US-based Invenergy has issued two project finance private placements (USD201m in total) for solar and wind projects in Uruguay. It also used an A/B bond structure. No green project bond issued yet from Brazil .
Green loans, syndicated loans and credit lines	Provides lending to encourage market development in climate aligned sectors in line with the Climate Bonds Taxonomy and in compliance with the Green Loan Principles.	Interest rates are based on borrower credit scores or an ESG score assigned by an ESG rating agency.	Green Funds, FIDCs (CVM 356), Private Funds (CVM 555) and FI-Infra (CVM 600)	Honduran company Ormat Technologies Inc. obtained a non-recourse project loan (of up to USD124.7m) to finance a 35MW geothermal power plant. The Finance Agreement was signed with the US development finance institution Overseas Private Investment Corporation (OPIC). BNDES launched the BRL500m (USD125m) Sustainable Energy Fund, structured towards the acquisition of renewable energy debentures carrying a green label.
Mezzanine and subordinated debt	Proceeds are allocated on nominated projects and assets.	Hybrid capital investments, from development banks seeking to support private investment in the senior debt or from investors with a higher risk appetite.	FIDCs (structured with subordinated quotas), Debêntures (subordinated series structure) Financiamento Mezzanine, Dívida Subordinada and Bônus Perpétuo	No green mezzanine or subordinated debt issued yet from Brazil .
Environmental impact bonds / pay-for-results green bonds	Proceeds allocated to nominated green projects/ assets. The payments to investors are conditional on the project achieving an expected outcome after a third-party evaluation has been conducted.	Part of the project's risk is transferred from the issuer to investors.	No specific Brazilian mechanism used yet for this structure.	In 2016, District of Columbia Water and Sewer Authority , a US Muni, issued a USD25m private placement to finance the construction of green infrastructure to absorb and slow surges of stormwater during periods of heavy rainfall. The structure of the bond included the conditional tied to the outcome of the project: if the project does not meet expectations, DC Water will make an outcome payment to investors ; if it does, no contingent payment will be due to investors; and if it exceeds expectations, investors will make a Risk Payment Share of USD3.3m to DC Water. No specific environmental impact/pay-for-result bonds issued from Brazil yet.

* CVM Instruction 400 – Public Offer

** CVM Instruction 476 – Restricted offer which only up to 50 qualified investors can participate.

***Federal states and municipalities are currently unable to sustainably access capital markets. According to local legislation federal states and municipalities can only issue debt with a sovereign guarantee, which have not been granted due to fiscal and payment capacity constraints.

Annex II: Green equity instruments applicable in Brazil

Equity instrument	Use of proceeds	Structure	Green example	Mechanism available in Brazil	Examples
Senior equity tranches	Purchase of equity stakes in projects of strategic social and environmental importance.	Structured senior investment grade equity tranches geared towards risk-averse investors.	No Green Senior equity tranche examples yet from Brazil	BNDESPAR	BNDESPar is a BNDES subsidiary holding that invests directly in companies and funds through shareholding and purchase of bonds and shares. The institution's approach is similar to a public investment fund, which directly capitalizes private initiatives.
Private equity buyout, venture capital and unlisted equity funds	Fund allocations to innovative pilot-scale green projects including for qualified green infrastructure.	Aid project developers and entrepreneurs to secure a funding stream for green projects. PE often incorporates green indicators into process.	BrasilPrev ESG Multi Asset Fund in 2019 allocated funds' quotas and invested in structured debt instruments with ESG benefits.	Private Equity Funds	Private equity funds are formed as a "closed-end fund" and invest in companies that have good growth and valuation potential. The purpose of these funds is to capitalize such companies, adjust management and sell the interest for a substantially higher amount than purchased. These funds were regulated by CVM 540 /13 and officially named as Fundos de Investimento em Participações (FIP) . Examples of this type of funds in the Infrastructure sector could be InfraBrasil (managed by ABN AMRO Real) and Logística Brasil (managed by BRZ Investimentos).
				Venture Capital	Venture capital is an alternative segment for financing activities by independent management companies, responsible for brokering funds to invest in shares of companies. VCF capital injections can be made through shareholding interest or other instruments such as convertible debt into shares and subscription bonus. This segment is still maturing in Brazil, and the existing fund options typically invest capital in projects already in development or in public concession projects that have already been completed. One example of an infrastructure VCF is the one managed by Garín that has invested in the initial structuring Projects such as Macapá (State of Amapá) and São Francisco do Sul (State of Santa Catarina) Ports.
Mezzanine and preferred stock (Green B-shares)	Hybrid financing typically from development banks and international finance institutions supported by subordination of equity tranches.	Capital market investments in a hybrid debt-equity tranche.	No green mezzanine and preferred stock yet from Brazil	Mezzanine	Programa Vivenda issued BRL5m in 2018, in two series of debentures, one through a private placement 'mezzanine', and the other through a CVM 476 senior instrument. ¹²⁵
Blended finance	Mix of public and private sector investment	Private sector co-investment in public sector projects	No green blended finance yet from Brazil	Blended Finance	This structure is still very innovative in the Brazilian Capital Market and generally being used by securitization companies and start-ups of social impact.

Annex III: Risk transfer instruments applicable in Brazil

Risk transfer mechanism type	Mechanisms available in Brazil	Details
Infrastructure Projects' Guarantee Mechanisms available in Brazil	Counterguarantee and Accounting Fund (Contragarantia and Fundo Contábil)	Funds originated by the revenues of the project, as determined by Federal Constitution on art. 167, subparagraph IV. Both mechanisms are exposed to Political and Judicial risks.
	Guarantee Funds	<p>1. Guarantee Fund for Electric Energy (Fundo de Garantia de Energia Elétrica - FGEE) provides guarantees for special purpose company established for the construction of electricity undertakings under the PAC, in the financing granted by the federal financial institution and its agents.</p> <p>2. Guarantee Fund for Infrastructure (Fundo Garantidor de Infraestrutura - FGIE) is a private fund (structured by ABGF - Guarantee Funds Manager Brazilian Agency), created in 2014, with the purpose of guaranteeing, directly or indirectly coverage for any risks, including unmanageable, related to concessions, subject to the conditions and forms provided for in its Bylaws.</p>
	Guarantees provided by state-owned companies	Federal Guarantees provided to state-owned non-dependent companies such as state development agencies
	Credit Insurance (Seguro- garantia, in portuguese)	The surety bond is hired from a Securitization company. The borrower shall pay a monthly amount to the guarantor to ensure the protection from losses in case the principal fails to meet obligations.
	Escrow Account	An Escrow Account works as a trilateral contract, signed by two contracting parties in a related legal transaction, and a trustee (who will monitor the execution of the main contract and will be entrusted with the custody of the assets in your guarantee)
	Pledge	As part of project financing, the following pledge modalities could be used: (i) industrial and commercial pledge of assets; (ii) pledge of receivables; (iii) pledge of contractual position and direct agreements with counterparty; (iv) pledge of shares of the special purpose company and usufruct conditional; and (v) current account pledge and account management agreement.
	Bank Guarantee	Bank guarantee (Fiança Bancária) is a guarantee offered by financial institutions to ensure the fulfilment of contracts with the public sector. In this case, the bank works as guarantor and issues a letter of guarantee to the lender. This instrument generally offers a limited source of financing and high interest rates.
	Completion Bond	Insurance policy provided by Insurance companies, which covers for the project's physical completion.
Currency Risk Hedge	Covered Bonds /LIG - Letra Imobiliária Garantida	LIG is the Brazilian real state covered bond that could be issued by financial entities, which backs investors in case of issuer failures.
	Non Deliverable Currency Forward Contract/ Contract Indexation	Lay down a commitment to buy or sell a particular asset at a currency rate previously agreed upon by the parties to protect economic agents against currency fluctuations. Examples of products available in Brazil are: (i.) the Forward Rate Agreement, provided by B3 ¹²⁶ and, (ii.) the NDFs (Non-Deliverable Forward)
	Currency Fund	Currency Funds could be an option for issuers and investors to invest their foreign currency resources in a fund that protects them from currency fluctuation losses.
	Stock exchange Future Market	Stock Exchange Future Markets features (i.) future contracts* that consist of a purchase and sale agreement for a certain quantity of standardized assets for settlement at a future date (i.e.: Electric Energy Future Contracts) and (ii.) Future Currency Market that is offered by B3 through their U.S. Dollar Future product.
	Currency Swap	Swap contracts operations are characterized by the exchange of cashflows between two agents through an intermediary financial institution (that could be B3 in Brazil). These operations protect the negotiating parts from price fluctuation and set a fixed price to the negotiated goods (i.e. commodities)

* Unlike forward contracts, they do not demand the physical liquidation of the contracts at the time of the operation

Annex IV: Green financing platforms/initiatives in Brazil

Type	Program	Definition
BNDES-provided senior secured credit facility	FINAME	Financing for the acquisition and sale of machinery, equipment, industrial systems, IT and automation goods, buses, trucks and business aircraft. An example of a credit line is Finame Renewable Energy which provides financing for the acquisition and selling of solar and wind power generation systems and solar heaters, including installation service and associated working capital.
	BNDES Project Finance	Financing for a project, contractually supported by its cash flow and backed by its assets and receivables.
	BNDES Avançar Cidades - Sanitation	BNDES credit operations for sanitation investments, selected under the Ministry of Cities Normative Instructions No. 29/2017, No. 7/2018 and 22/2018.
	BNDES Automático - Investment Projects	Financing up to BRL150m for investment projects of companies from all sectors.
Banco do Nordeste (BNB) Loans for Infrastructure	FNE Water	FNE Água finances up to the total value of projects for the efficient and sustainable use of water, with resources from the Northeast Constitutional Financing Fund (Fundo Constitucional de Financiamento do Nordeste - FNE). It is possible to get up to 100% of funding, depending on size and location.
	FNE Proinfra	FNE Proinfra aims to finance the acquisition of capital goods and implementation, modernization, renovation, relocation or expansion of enterprises. The sectors included in its framework are: energy, water infrastructure and basic sanitation, logistics and transportation, ICT, and natural gas (which is excluded from the Climate Bonds Taxonomy).
	FNE Sol	FNE Sol can finance all components of micro and macro power generation from photovoltaic, wind, biomass or small hydroelectric sources, as well as their installation.
	FNE Verde	BNB's Financing Program for Environmental Sustainability finances the implementation, expansion or modernization of projects (except in cases impacting on native forest), aiming to promote projects and economic activities that foster environmental preservation, conservation and recovery.
BDMG Credit Lines for the Public Sector	BDMG Credit Line for municipalities and concessionaires	BDMG credit lines support the industry on public infrastructure projects of energy efficiency, urban mobility, water supply, sewage and solid waste solutions and expansion or renovation of municipal public buildings (in addition to other categories that does not meet iClimate Bonds green taxonomy and criteria, such as acquisition of road machinery and paving equipment, trucks and tractors, construction).
Caixa Economica Federal Credit Lines for the Public Sector	Pró-Infra	Pró-Infra is a program for financing public urban infrastructure projects. The resources are passed on to Federal states and the Federal District, according to the stages of the project.
	Pró-Transporte	The Pró-Transporte program finances mass transportation infrastructure for the public and private sector. The program transfers Federal revenue (originated by citizens FGTS tax contributions) to Federal states, the Federal District, municipalities, non-dependent public concessionaires or private urban transport concessionaires.
	Programa Mobilidade Urbana	The Urban Mobility Program supports projects of mass and non-motorized transportation, such as structural urban corridors and projects of integrated urban rail network.
	Pró-Municípios	The program supports the implementation and improvement of municipalities urban infrastructure. Pro-municípios is managed by the Ministry of Cities - MCidades (which since 2019 is part of Ministry of Regional Development) with Federal resources.

Annex V: Green standards applicable in Brazil

Green Standard	Description	Sector(s)	Applicability in Brazil
IDB Sustainable Infrastructure Framework	<p>A framework of sustainability criteria that covers an integrated spectrum of economic, financial, environmental, social, and institutional dimensions for infrastructure projects. The framework addresses three key stages of infrastructure delivery: policy and planning (or upstream level), project preparation and design, and financing.</p> <p>The framework consolidates the fundamental environmental, social, institutional, economic, and financial principles for implementing sustainable infrastructure investments and is applicable throughout the entire project cycle and across different sectors and regions.¹²⁷</p>	Infrastructure	This framework contemplates a series of guidelines that could be applied to projects in Brazil.
Climate Bonds Taxonomy	<p>Climate Bonds Taxonomy is used to identify green projects and assets which are aligned with achieving the goals of the Paris Agreement. This excludes fossil fuel power generation, internal combustion engine personal vehicles and new roads and infrastructure that facilitate their movement, and freight rail that is primarily used for fossil fuel transportation.</p> <p>See back cover for details.</p>	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	<p>The taxonomy has been used to certify five deals in Brazil. For example, the BRL127.78m green bond issued by Rio Energy in August 2018 was a Certified Climate Bond.</p> <p>It can be used to certify green bonds as well as be used for portfolio review and green tagging of assets and projects.</p>
Effective energy management systems (EnMS)/ISO 50001	<p>The ISO 50001 standard establishes an international framework for the supply, use and consumption of energy in industrial, commercial and institutional organizations. Implement an ISO 50001 compliant sustainable energy management system and demonstrate organization's commitment to continuously improving energy performance, leading to economic benefits and reduced greenhouse gas emissions.</p>	Renewable energy, Energy efficiency	As of 2018, Brazil records only 33 companies certified by ISO 50001. ¹³¹
GRESB Infrastructure ESG Benchmark	<p>The GRESB Infrastructure Assessment is made up of two complementary components: a Fund Assessment and an Asset Assessment. There is also a third component that is optional: the Resilience Module.¹²⁸</p> <p>The Infrastructure Fund Assessment assesses the ESG performance of infrastructure funds, and the Infrastructure Asset Assessment assesses ESG performance at the asset level for infrastructure asset operators, fund managers and investors that invest directly in infrastructure.</p>	Infrastructure	Some Brazilian firms are members of GRESB.
The Standard for Sustainable and Resilient Infrastructure (SuRe)	<p>SuRe is a global voluntary standard which integrates key criteria of sustainability and resilience into infrastructure development and upgrade, through 14 themes covering 61 criteria across governance, social and environmental factors.¹²⁹</p>	Infrastructure	This framework could be applied in Brazil.
Envision	<p>Envision is a framework that includes 64 sustainability and resilience indicators, called 'credits', organized around five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Resilience. These collectively address areas of human wellbeing, mobility, community development, collaboration, planning, economy, materials, energy, water, silting, conservation, ecology, emissions, and resilience.¹³⁰</p>	Infrastructure	This framework could be applied in Brazil.

Annex VI: Green pipeline analysis

This sample pipeline includes a list of 'green' and 'potentially green' projects taken from various public sources. Four sectors are covered in the list, including: low carbon transport, renewable energy, sustainable water management and sustainable waste management. The assessment of the 'greenness' of each project was based on the Climate Bonds Taxonomy (see back cover).

Table 1. Green projects

Sector	Project name	Location	Status
Low carbon transport 	Privatization of Empresa de Trens Urbanos de Porto Alegre S.A. (Trensurb) (Railway extension)	Rio Grande do Sul	Planned
	Concessão da EF-354 - Ferrovia de Integração Centro-oeste (Railway extension)	Goiás, Mato Grosso	Planned
	Concessão do Tramo Norte do Ferroanel de São Paulo (Railway extension)	São Paulo	Planned
	Ferrovia EF-151 - SP/MG/GO/TO (Ferrovia Norte-Sul) (Railway extension)	São Paulo, Minas Gerais, Goiás, Tocantins	Planned
	Ferrovia EF-170 - MT/PA - Ferrogrão (Railway extension)	Mato Grosso, Pará	Planned
	EF 354 - Mara Rosa GO - Água Boa MT (Railway extension)	Goiás, Mato Grosso	Planned
	Light Rail Vehicle in Salvador	Salvador- Bahia	Under construction
	Linha 08 Diamante e Linha 09 Esmeralda de Trens metropolitanos (Municipal rail works)	São Paulo -SP	Planned
	Trem Intercidades: Trecho São Paulo - Americana (Extension urban rail)	São Paulo -SP	Planned
	Veículo Leve Sobre Trilhos (VLT) - Teresina (Light Rail Vehicle works)	Piauí	Planned
	Metrofor PPP - Metro and LRV (Urban rail extension and works)	Ceará	Planned
	Programa Avançar Cidades- Contagem, Minas Gerais (Public transport works)	Contagem -Minas Gerais	Planned
	Programa Avançar Cidades- Cascavel, Paraná (Public transport works)	Cascavel- Paraná	Planned
	Programa Avançar Cidades- Petrolina, Pernambuco (Public transport works)	Petrolina- Pernambuco	Planned
	Expansion of Metro System of Salvador	Salvador- Bahia	Planned
	Light Rail Vehicle in Sorocaba	Sorocaba- São Paulo	Under Construction
	Brasília Public Lighting (Energy efficient street lighting)	Distrito Federal	Under Construction
	Light Rail Vehicle (Norte - Brasília)	Distrito Federal	Planned
	Light Rail Vehicle (W3 -Sul)	Distrito Federal	Planned
Public Lighting in the city of Porto Alegre (Energy efficient street lighting)	Porto Alegre - Rio Grande do Sul	Planned	
Renewable energy 	Planta de Energia Fotovoltaica (Solar energy development)	Ceará	Under Construction
	Atlas Renewable Energy PV solar project	Bom Jesus da Lapa -Bahia	Completed
	Atlas Renewable Energy PV solar project in Barreiras	Barreiras -Bahia	Under Construction
	Apodi PV Solar Portfolio	Quixeré- Ceará	Completed
	BJL11 Solar Power Plant	Bom Jesus da Lapa -Bahia	Under Construction
	Floating solar power plant - Tucuruí Hydropower Complex	Pará	Planned
	Paraíba Wind Power Complex	Paraíba	Planned
Sustainable water management	Usina de Dessalinização (Desalination plant development)	Ceará	Under construction
	Reuse of treated sewage from treatment station in Vitória	Vitória - Espírito Santo	Planned

Table 2. Potentially green projects

Sector	Project name	Location	Status
Low carbon transport 	Public lighting in the city of Rio Branco	Rio Branco - Acre	Planned
	Complexo Madeira Marmoré (Railway extension)	Porto Velho - Rondônia	Planned
	Public Lighting in the city of Belém	Belém -Pará	Planned
	Ferrovias Paraense (Railway extension)	Pará	Planned
	Works on the Urban Train System (Public transport works)	Recife - Pernambuco	Planned
	Novo Sistema de Transporte/ BRT (Public transport works)	Belém -Pará	Planned
	Public Lighting in Salvador	Salvador- Bahia	Planned
	Public Lighting in São Paulo	São Paulo	Planned
Public Lighting in São Miguel do Iguaçú	São Miguel do Iguaçú-Paraná	Planned	
Renewable energy	Pedro Afonso Thermal Power Plant (Bioenergy)	Tocantins	Completed
Sustainable water management 	Saneamento - Teresina (Developments of water and sewage services)	Piauí	Planned
	Water Infrastructure for the municipalities in the countryside of the State of Amazonas- Funded by Funasa	State of Amazonas	Under construction
	Programa de Saneamento Integrado de Maués (ProsaiMaués) (Development of basic sanitation)	Maués - Amazonas	Planned
	Expansion of the sewage system in the city of Maceió	Alagoas	Planned
	Paraíba Rural Sustentável (Rural water supply)	Paraíba	Planned
	Sistema adutor Transparaíba (Urban water supply)	Paraíba	Planned
	Basic Sanitation for the City of Recife (Development of basic sanitation)	Recife - Pernambuco	Planned
	Cariacica Sanitation (Development of basic sanitation)	Cariacica - Espírito Santo	Planned
	Rio Grande do Sul State Sanitation Company Corsan PPP (Development of basic sanitation)	Rio Grande do Sul	Planned
	Sabesp - Improving Water Service Access and Security	São Paulo	Planned
	Water infrastructure for the city of Junqueirópolis	Junqueirópolis- São Paulo	Planned
Public Private Partnership of Basic Sanitation	Porto Velho- Rondônia	Planned	
Sustainable waste management 	Aterro Sanitário e Construção de Usina de Resíduos Sólidos em Boa vista (Waste to energy facilities)	Boa Vista - Roraima	Planned
	Biogas Plant in Paraná (Waste to energy facilities)	Paraná	Planned
	Biogas Plant in Entre Rios do Oeste (Waste to energy facilities)	Paraná	Completed
	Biogas generation in Pernambuco (Waste to energy facilities)	Pernambuco	Completed
	Biogas generation in Maranhão (Waste to energy facilities)	Maranhão	Under construction
Estação de Transbordo da Companhia Municipal de Limpeza Urbana (Comlurb) (Waste to energy facilities)	Rio de Janeiro	Completed	

Notes:

- 'Potentially green' projects are projects that could be considered green; however, more information is needed to determine their greenness.
- This is a sample pipeline and is therefore not comprehensive.

Climate Bonds Taxonomy

The Climate Bonds Taxonomy identifies the assets and projects needed to deliver a low carbon economy and gives GHG emissions screening criteria consistent with the 2-degree global warming target set by the COP 21 Paris Agreement.

More information is available at <https://standard.climatebonds.net/taxonomy>.



ENERGY	TRANSPORT	WATER	BUILDINGS	LAND USE & MARINE RESOURCES	INDUSTRY	WASTE	ICT
Solar	Private transport	Water monitoring	Residential	Agriculture	Cement production	Preparation	Broadband networks
Wind	Public passenger transport	Water storage	Commercial	Commercial Forestry	Steel, iron & aluminium production	Reuse	Telecommuting software and service
Geothermal	Freight rail	Water treatment	Products & systems for efficiency	Ecosystem conservation & restoration	Glass production	Recycling	Data hubs
Bioenergy	Aviation	Water distribution	Urban development	Fisheries & aquaculture	Chemical production	Biological treatment	Power management
Hydropower	Water-borne	Flood defence		Supply chain management	Fuel production	Waste to energy	
Marine Renewables		Nature-based solutions				Landfill	
Transmission & distribution						Radioactive waste management	
Storage							
Nuclear							

Certification Criteria approved
 Criteria under development
 Due to commence

09/2019

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In partnership with Inter-American Development Bank

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