

Opportunities for Sustainable Infrastructure Investments at City Level in Brazil



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This project is being implemented under “InfraInvest: Sustainable Infrastructure for Brazil” and has been commissioned by the Brazilian Federal Government, through the Ministry of Planning, Development and Management and is being supported by the Inter-American Development Bank (IADB).

The project will seek to identify green finance opportunities for cities in water and sanitation, waste to energy and urban mobility. These sectors have been selected given the investment needs in Brazilian municipalities and their alignment with low carbon development and resilience.

This brief will be used to raise awareness across key infrastructure stakeholders in Brazil, and build a number of market

education activities in the second semester of 2018. Once a potential project pipeline is identified, a wider report will be produced identifying market barriers and the detailed regulatory and policy recommendations to unlock investment potential. A pilot case will also be identified in 2019, to be showcased to investors.

Preliminary Recommendations

- **Include climate resilience as a further priority sector** in COFIEIX’s list of themes for granting municipalities easier access to external finance.
 - **Integrate climate resilience into Investments Partnerships Programme (PPI) portfolio.** The government’s program incentivises the partnership between public and private sectors as well as the privatisation of public
- **Incorporate climate risk exposure to new infrastructure plans,** accounting for future depreciation of assets due to change in precipitation patterns, temperature increases and extreme weather events.
 - **Prioritise green infrastructure debentures issuance.** They are currently more appealing to individual investors, since the Brazilian government is granting fiscal incentive to these investors for this debt instrument.
 - **Partner with development entities,** which can help leverage financing and/or reduce the risk of infrastructure projects.

infrastructure. Integrating climate resilience into its portfolio will accelerate the delivery of infrastructure for climate risks mitigation.

Brazil’s Green Investment Potential

Brazil has an estimated US \$1.3 trillion green investment potential for power, transport, buildings, waste and industrial energy efficiency,¹ based on its climate commitments set out in the Nationally Determined Contribution (NDC). The bulk of this is in renewable energy and urban infrastructure including transport and waste.

Investing in low carbon climate-resilient infrastructure as well as being required to meet NDC targets, is also an opportunity to establish a sustainable growth path, as set out in the Sustainable Development Goals (SDGs) around cities (SDG 11) and clean water and sanitation (SDG 6).

With over 400 municipalities located along the coast, more than 50 mn² Brazilians are directly vulnerable to the impacts of climate change in the coming decades, and so are some of the country’s financial and industrial centres. Over 85% of Brazil’s population currently lives in cities and the rapid expansion of the country’s urban conurbations requires a substantial deployment of infrastructure over future decades. Failure to incorporate climate change impacts into infrastructure planning poses serious

economic risks at a national level, which can result in severe economic losses.

The current urban infrastructure finance is mostly limited to public financing, such as via BNDES, or individual investors who buy incentivised infrastructure debentures due to a tax benefit. At the same time, Brazil has hundreds of billions of dollars in assets under management by institutional investors, particularly pension funds, which are traditionally allocated in government bonds.

Integrating climate mitigation and resilience criteria into mainstream infrastructure planning will provide Brazil with the opportunity to access new capital flows that are looking for green, especially on the international market. Financing infrastructure is currently a challenge for Brazilian municipalities, which rely on government transfers and tax revenues.³ International credit operations have become tougher since the implementation of Law 101/00, also known as the “Law for Fiscal Responsibility”, which made the process for granting government guarantees for financing public infrastructure more challenging. The current Law then, obligates

local governments to finance debt only with authorisation and guarantees structures from the federal government, who not only has a limited percentage⁴ of its net revenues to offer as a guarantee, but has also been covering the debts of a number of defaults from its subnationals, in the last years. Such changes on the regulatory environment have also provided an opportunity for establishing innovative mechanisms, such as concessions and PPPs for key public services and infrastructure development, particularly in the transport sector. In these cases, the infrastructure company can implement high value projects with a less bureaucratic access to funding. On these Public-Private Partnerships, private companies are given the duty to build a public infrastructure or provide a public service backed by a special enhanced guarantee provided by the Government that can be used to collect resources in the financial market.⁵

Green Bonds Opportunity in Brazil

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.

Over the past few years, there has been a steady growth in demand from Institutional investors, particularly in OECD countries and China, for investment opportunities that address climate change and support sustainable development.

This has resulted in the development of new financial products which include: green loans; green, social and sustainable bonds; green infrastructure investment trusts; and, green index products.

Demand for sustainable investments is increasing globally

Green bonds are debt instruments that raise capital exclusively to finance or re-finance projects and assets with environmental benefits. The vast majority to date is funding assets and projects that deliver climate change mitigation and/or adaptation impacts. A small share of green bond proceeds is allocated to assets and projects with other environmental benefits such as preserving biodiversity; conservation of natural resources; and, air, water and soil pollution control.

Brazil's Green Bond Market: US \$4.4bn in issuance and growing⁶

The first Brazilian green bond was issued only in June 2015 and the market has grown exponentially since then, with 16 issuances until July 2018. But this is only a small fraction of the investment needed and **there is significant potential for expansion, particularly with urban infrastructure.**

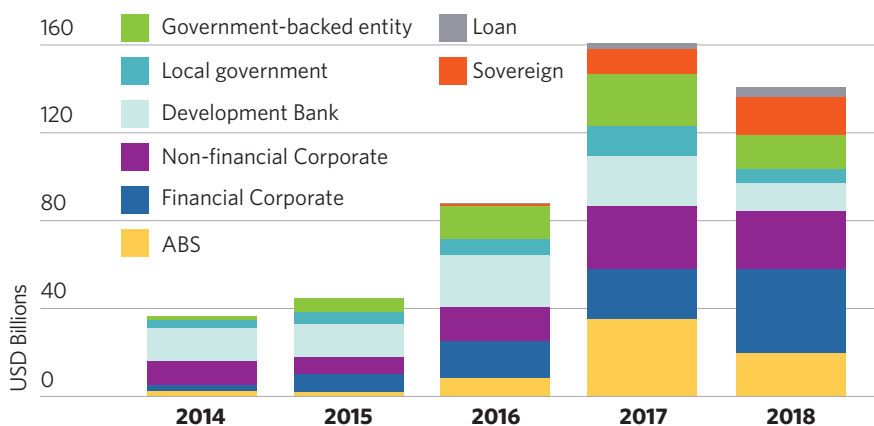
Brazil's market has been largely driven by the pulp and paper and renewable energy sectors:

Implementing Brazil's NDC⁷ under the Paris Agreement will demand substantial investment. But with public spending and fiscal restrictions, crowding-in private capital will be essential to finance the NDC and other infrastructure needs. Green bonds have the potential to leverage the strengths

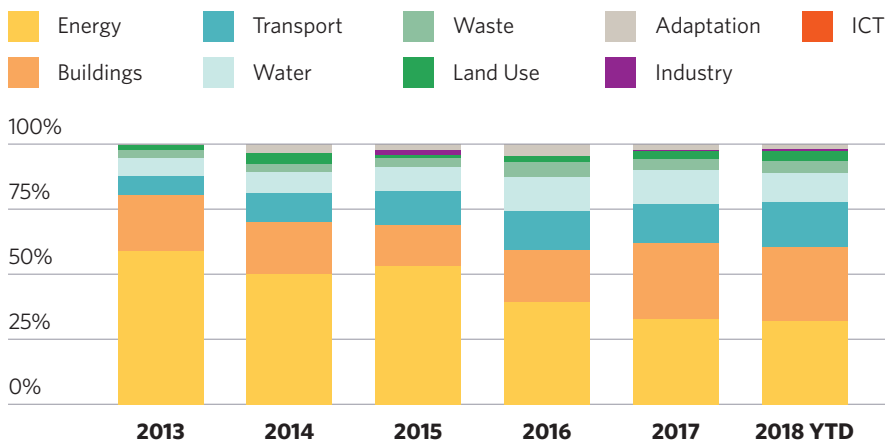
of Brazil's key sectors and shift investment towards a low-carbon economy.

Some of Brazil's largest investors, representing R\$1.8 trillion in AUM, have also come together during this period and issued a [Green Bond Statement](#), making a public commitment to foster a domestic green bond market. It is important to develop a strong and bankable pipeline to meet the local and international demands.

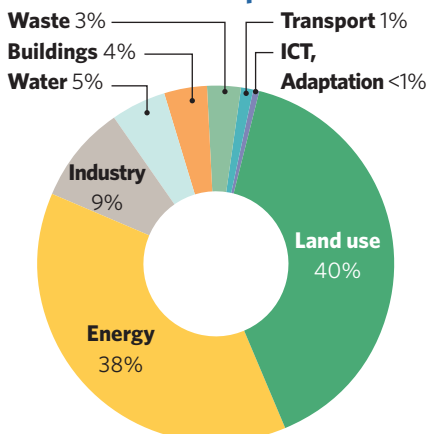
Evolution of the Global Green Bonds Market



Green bonds: Use of proceeds is diversifying



Cumulative use of proceeds



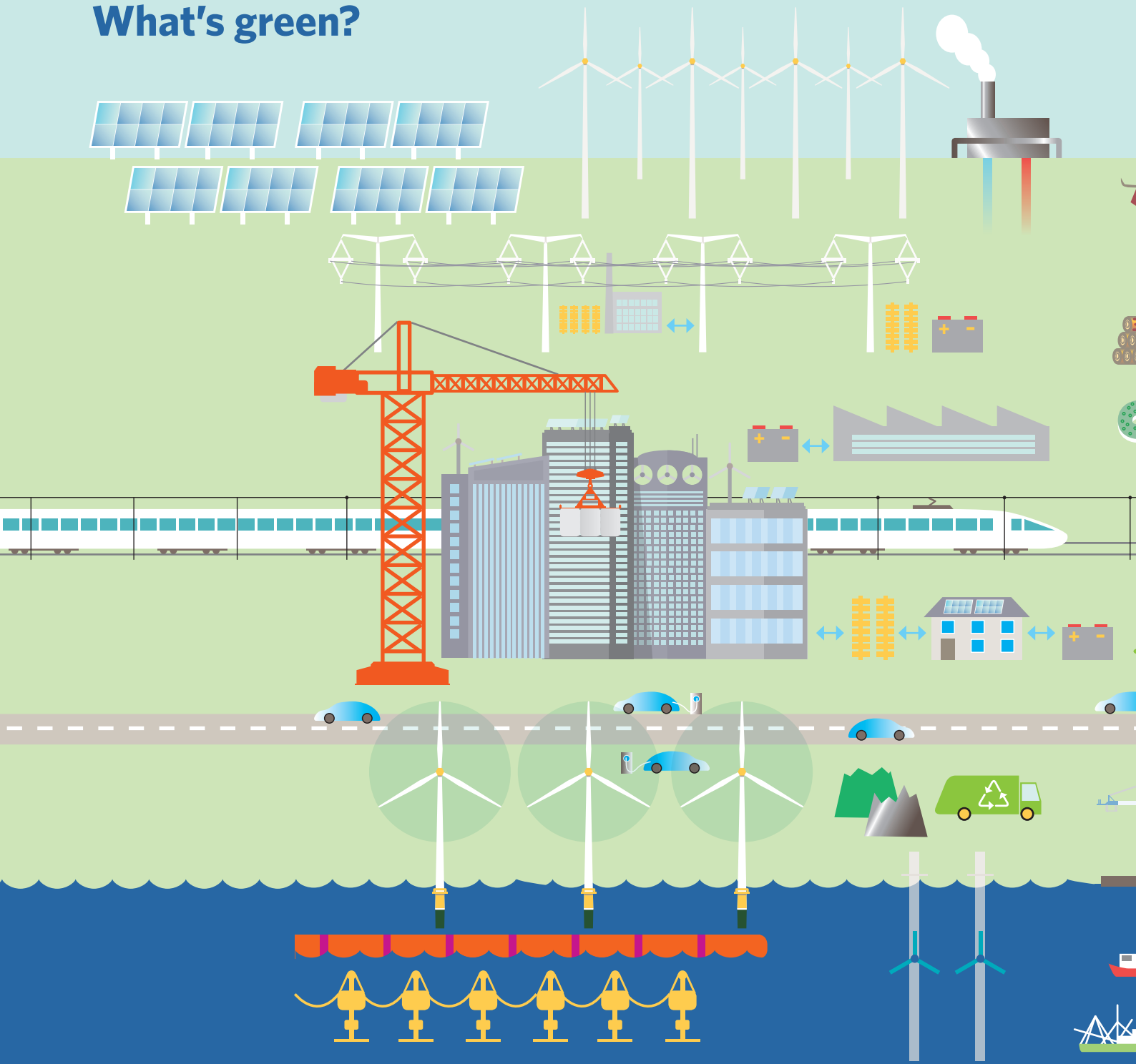
Benefits for investors

- Produce comparable financial returns with the addition of environmental benefits.
- Satisfy Environmental, Social and Governance (ESG) requirements for sustainable investment mandates.
- Enable direct investment in the 'greening' of brown sectors.
- Increase transparency and accountability on the use and management of proceeds.

Benefits for issuers

- Provide an additional source of green financing.
- Can match maturity with project life and/or investment cycle.
- Improve investor diversification and attract buy-and-hold investors.
- Enhance issuer reputation.
- Attract strong investor demand, which may lead to high oversubscription and pricing benefits.

What's green?



Waste to Energy:



Treating residual waste with various Waste-to-Energy (WtE) technologies is a viable option for disposal of Municipal Solid Waste and energy generation. There are many factors that will influence the choice of technology and every region will have to properly assess its specific context to implement the most reasonable solution.

World Energy Council

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.

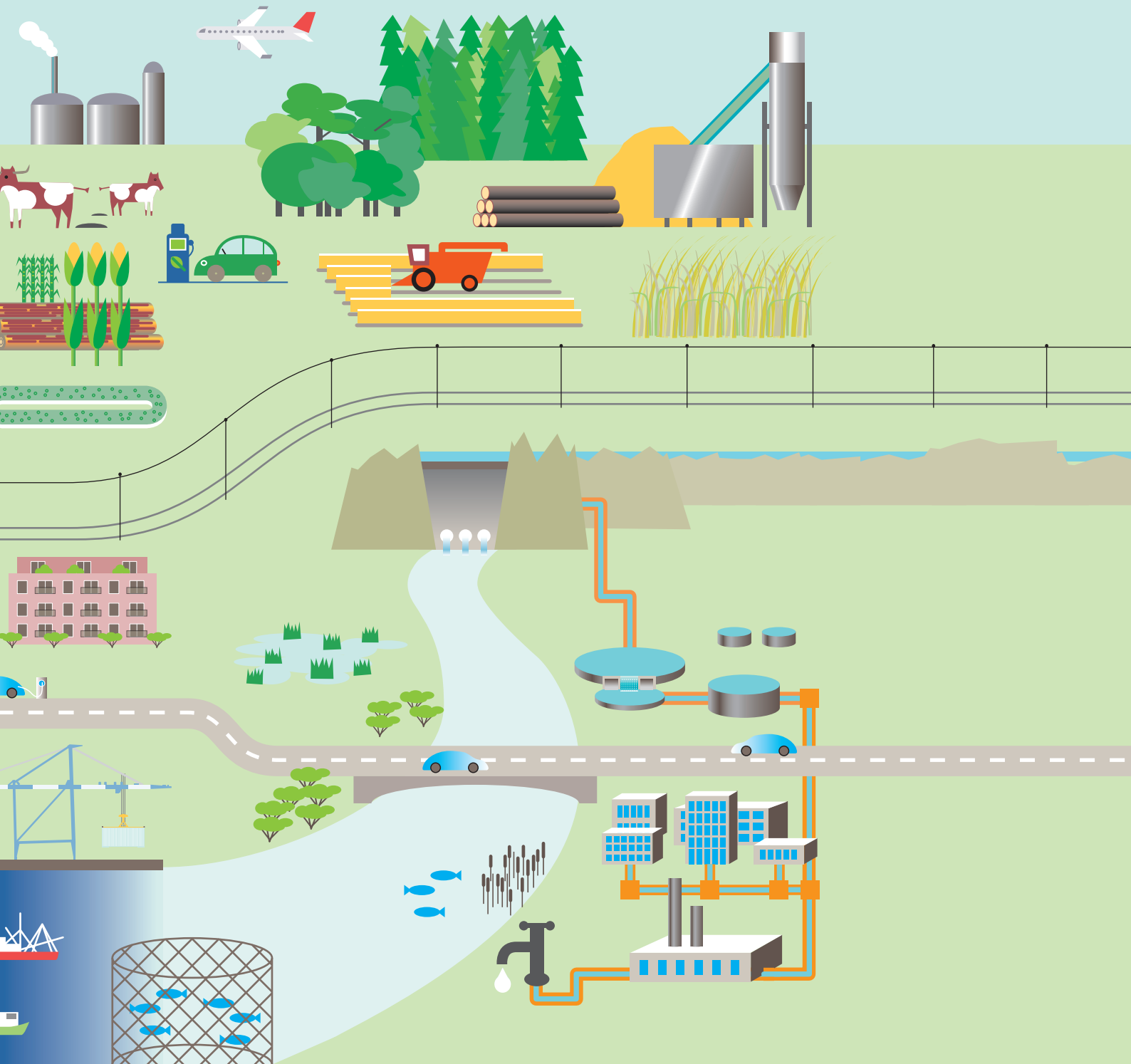
UNFCCC

Public Lighting:



The value proposition of LED street lighting is compelling from a cost, environment, safety and service perspective. Innovations in lighting technology, systems and controls now mean that street lighting is much more energy efficient, offers better quality light and can help local authorities save money, while improving the services they offer their constituencies.

UN Environment's United for Efficiency (U4E) Initiative



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.

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.

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.

GreenBiz

Green Infrastructure Investment Opportunities in Brazil

This section provides an initial assessment of Brazil's sustainable infrastructure opportunities for different sectors. This project has selected three key sectors based on their green investment potential and their city-level impact.

Further to these three sectors, Brazil has a substantial green finance project pipeline across other sectors; like buildings, agriculture and energy. The results of this project will certainly generate co-benefits for leveraging project pipelines across the economy.

Internationally aligned green definitions

The "green" definitions used to identify eligible assets in this report are taken from the Climate Bonds Taxonomy, an international science-based classification system for climate investments.

1. Water and Sanitation

Estimates show that R\$317bn (approx. USD 82bn) in investments would be required until 2035 to ensure universal water and sewage treatment to all Brazilians.



In 2017, Brazil invested R\$9bn into water and sanitation. Nearly half of all Brazilians do not have access to sewage systems or treatment and 35mn people do not have access to drinking water. Brazil's water system has an average loss rate of 37%, a cost of approximately R\$8bn, due to leakages, poor management and theft.⁸

The implementation of sustainable water and sanitation systems would increase water security and resilience in the country, and green finance could be an alternative source of capital for the sector.

Examples of Green bonds for water

USD17 billion has been raised through green bonds to fund water projects since the market's inception. Issuance is predominant in the US and Europe, with corporate issuers mainly active in the UK and France while local governments dominate the US market. Water is in the fact the largest sector of investment of US municipalities through green bond issuance.¹⁵

Alongside municipalities, public utilities can also raise finance through green bonds for water and wastewater projects. In May 2016, the San Francisco Public Utilities Commission issued a USD240mn for wastewater and storm water management projects. The bond was the first certified against the water criteria under the Climate Bonds Standard.

Green bonds for water infrastructure are appearing across different geographies and are expected to grow in emerging markets, as water stress is a key issue in several developing countries. In July 2017, the City of Cape Town issued a green bond for ZAR1bn (USD77.2mn). The bond was 4 times oversubscribed and received interest from 31 different investors. The proceeds were used to refinance projects for sustainable water management and sanitation projects, including water capture, storage and distribution infrastructure and alternative water treatment plants, supporting the city in reaching its climate resilience and social targets. The bond was certified against the Climate Bonds Standard.

Currently, the sector is mostly supported by public finance, which has a mandate to cover up to 95% of financeable items,⁹ recently up from 80%,¹⁰ but in practice a substantial gap remains.

Potential eligible assets:

Sustainable water management: assets that either reduce or have a neutral impact on greenhouse gas (GHG) emissions over their lives; support climate adaptation; or increase the resilience of surrounding watersheds.

This could include the following assets and projects: water capture and collection, water storage, water treatment (with methane capture and energy recovery), flood defence, drought defence, storm-water management, and ecological restoration/management as well as grey, or built water infrastructure and nature-based water infrastructure.

2. Sustainable Waste Management



An estimated R\$11,6 bn/yr (approx. USD 3bn) in infrastructure investments until 2031 is needed to ensure universal sustainable waste management in Brazil.¹¹

Municipalities are planning projects to introduce and improve waste management services in order to implement the revised 2010 policy.¹² So far 40% of the necessary landfills have been rolled out and this new policy presents an opportunity to ensure any new waste management systems are sustainable and maximise materials and energy recovery.

One of the main implementation challenges is finance. Municipalities have to operate within the current fiscal regulations limiting their ability to fund discretionary capital projects. Sustainable waste management could offer a regular source of revenue from materials recovery and energy sales. It can also reduce the level of freshwater contamination from the leachate run-offs from poorly operated waste handling.

Demand for waste-to-energy facilities in Brazil are likely to rise, as dumpsites are gradually being phased out, mandated by federal legislation, through Law 12.305/10 which establishes the National Waste Policy. Investing in waste-to-energy facilities can yield both environmental and financial benefits. These facilities mitigate GHG emissions by generating energy from landfill gas; reducing waste; and promoting reuse/recycling

SANASA (Campinas Water and Sanitation Company):

SANASA is a concession company responsible for the water management of the city of Campinas, located in the state of São Paulo. SANASA is known for being one of the most efficient water and sanitation companies in Brazil, employing state of the art technology to treat and produce reclaimed water. It provides drinking water to 99,7% of the city's inhabitants, with technology to ensure 99% purity in a chemical-free treatment process.

SANASA was also the first company in the country to have a Production Station for Reclaimed Water (EPAR). In 2017, SANASA

finished the construction of a new water reservoir that, besides preserving 160 acres of forests, will guarantee the city water supply for the next 50 years. These investments have already proven to reduce emissions and will also provide climate resilience. It has made the city of Campinas less dependent on São Paulo's Cantareira Supply System, which has suffered significantly since the extreme drought that hit the southeast of Brazil between 2014 and 2015.

Investments such as these are eligible for Certified Green Bonds and could directly benefit from green finance flows.

practices. They also create new revenue streams (or savings) for municipalities as they sell off excess energy into the grid.

Implementation of such systems would certainly benefit from accessing green finance markets, provided local regulatory and finance constraints can be overcome.

Potential eligible assets:

Sustainable waste management: projects to divert discarded goods from the entering the waste stream either by reuse or recycling, projects to enhance the collection of municipal solid waste and the separate green waste projects to convert the residual waste 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.

Sustainable Waste Management in Curitiba

All of Curitiba's waste is disposed of in landfills, in compliance with the National Waste Policy.¹⁷ One of these landfills, located within the Metropolitan area features sewage treatment and systems to prevent leaks, as well as biogas capture for electricity generation. The municipality is now proposing to add recycling to the waste management contracts¹⁸ as there is significant scope to expand.

A recently approved municipal law, Law 15277/18, allows for the use of municipal public assets (namely public buildings and land) to be used for renewable energy generation, including from residual biomass (i.e. from organic waste, for example).

3. Low Carbon Transport Systems



Estimates show that Brazil has a U\$209bn climate-smart investment potential in urban transport infrastructure by 2020.¹³ These include rail, mass-transit systems, and further adoption of biofuels in road transport, the predominant system in the country.

Uniquely, a large proportion Brazilian cars use bioethanol, greatly reducing road

Examples of Green bonds for low carbon transport

Transport currently accounts for only 15% of green bond investments to date, but has been identified as the largest sector for market growth, as shown by a recent analysis of climate-aligned bonds that could carry a "green" label, with USD505.4bn outstanding bonds.¹⁹ Issuers include large railway corporations in China, Europe and US. Transport is also an important theme in the local government green bond universe, where it constitutes 37% of the market share.

Outside of Europe and the US, Mexico City issued its first green bond in 2016 largely to finance new and existing low-carbon projects. The MXP 1 bn (approx. USD 50 mn) 5-year bond was 2.5x oversubscribed; the external review was carried out by Sustainalytics. Eligible projects were identified for MXP 1.35bn, including:

- **Low carbon transport:** MXP 187 mn of new metro equipment and MXP 560 mn

refinancing of metro, light rail and BRT construction and maintenance projects.

- **Water and wastewater management:** MXP 538 mn for new projects for construction or replacement and maintenance of drainage and water capture systems, water treatment plants, wells and distribution canals for drinking water.
- **Energy efficiency:** MXP 65 mn for new installation and maintenance of street LED lighting.

Alongside municipalities, transport authorities can raise green bonds to finance low-carbon urban infrastructure. The New York Metropolitan Authority has identified a USD 11 bn portfolio of eligible projects (certified against the Climate Bonds Standard) against which it regularly issuing green bonds to finance the maintenance and repair of the New York metro transport system.

transport's GHG emissions. There are opportunities for local governments to expand and enhance of its public mass-transit systems (bus or subway) displacing car-based transport: this can free up the bioethanol for alternate uses.

The electrification of transport systems, eligible green assets under the Climate Bonds Standard, is a reality and will see a steep rise in demand in Brazil over the coming years. **The National Electricity Regulator (ANEEL) has issued regulation on provision of charging services for electric vehicles,¹⁴ with 2025 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 already a reality and could replace mass-transit vehicles in the short term, crucial for urban mobility.

Potential eligible assets:

Low carbon transport: transportation modes and ancillary infrastructure that produce low or no carbon emissions, as they are powered by renewable energy or fuel sources. This can include national and urban passenger rail and freight networks (where freight lines,

rolling stock or related infrastructure is not fully dedicated to the transportation of coal, oil or other fossil fuels); Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.

Low Carbon Transport Systems and the city of Belo Horizonte:

Belo Horizonte has a 2030 Urban Mobility plan¹⁶ which was launched in 2017. It focusses on promoting the transition low carbon systems and minimised environmental impact. Some of the measures include:

- Prospecting and promoting the substitution of the public transport fleet with more carbon efficient vehicles;
- Ensuring the harmonization of environmental policies and commitments with the city's urban mobility planning.

As an example, electric buses are being tested for additional lines in the capital. Financing for this expansion of Urban Mobility could be eligible for green finance, with the potential to accelerate green infrastructure deployment.

Challenges of funding green infrastructure in Brazil

In this section, we set out the basic challenge facing investment in green infrastructure in Brazil.

The country suffered a serious economic downturn between 2014 and 2016 causing a 7% drop in output and unemployment rose from 6.8% to 11.3%.²⁰ Since then there has been a mild recovery, 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 has resulted in a deterioration in its credit rating which S&P down-graded in January 2018 to BB-. Moody's gives Brazil a rating of BA2. These low credit rating means Brazil's sovereign debt is not investment grade.

The fiscal deficit has been particularly acute at the sub-national government level. By 2016 local government revenue had declined to around 12% of GDP, but expenditure had steadily risen to around 18% - a substantial structural deficit caused in large part by excessive spending on personnel and staff pensions. Central government has reigned in local government spending by introducing tight controls on municipal spending and new borrowing in the Fiscal Recovery Bill, freezing new hiring, forbidding new credit loans outside the framework of the state's Fiscal Recovery Plans.²¹

The political difficulties of implementing spending cuts is illustrated by Rio de Janeiro's efforts to reduce transport subsidies. The subsidised fare program was suspended in December 2016 because the state program was unable to pay the R\$10mn subsidy for the concessionary fares. Such a suspension would have impacted 5mn people every day. Under political pressure the state reinstated the reduced fares promising to liquidate the debts owed to the transport company.²²

These restrictions on sub-national governments have meant they have had to prioritise non-discretionary spending programmes like education, over discretionary expenditures on new infrastructure. However, states still need to invest in new infrastructure for water and sanitation, waste treatment and public transport if they are to improve the quality of lives of their citizens.

Restoring state's capacity to make investments in essential green infrastructure within the confines of this tough fiscal situation means addressing two issues:

- making the underlying economics of environmental infrastructure projects more attractive,
- attracting private capital into the infrastructure provision at terms that are mutually advantageous to the state and the private firm.

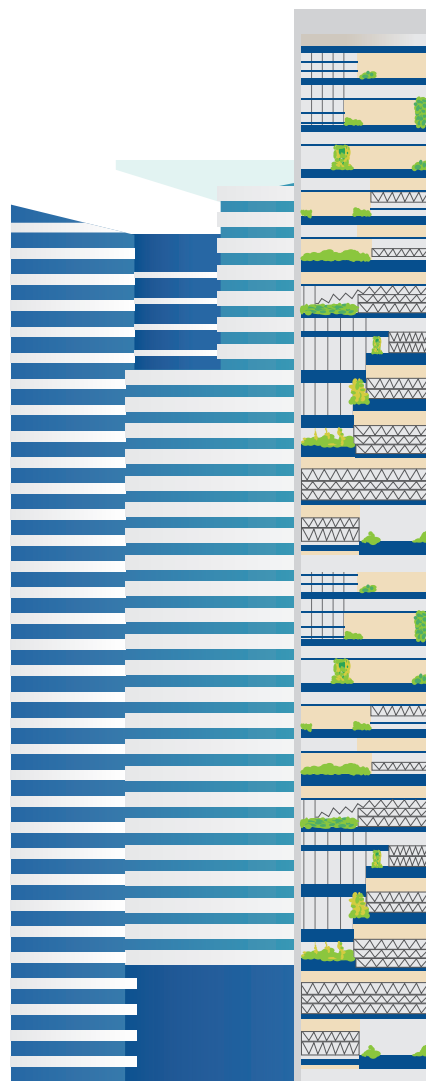
It is essential that policy changes address the underlying economics of environmental infrastructure projects in waste, transport and water through ensuring robust revenue streams/grants so that enable projects to generate sufficient revenue to pay the costs of debt service and operations. At present domestic waste collection and disposal is not revenue generating and fares from mass transportation systems are inadequate and so either need to be increased, or supplemented with other revenue streams.

Given the restrictions on sub-national government spending, authorities have to rely on alternate structures for organising the provision of public services to bring in private sector capital. Two specific approaches will be analysed:

- **Concessions** e.g. private firms that have been given exclusive rights to build and operate infrastructure (e.g. private water and sanitation companies such as AEGEA, BRK Ambiental, etc), and
- **Partnerships** in which a sub-national government and the private sector form a jointly managed entity to fund, build and operate the infrastructure (e.g. PPPs for metro lines and other urban mobility projects in various cities such as São Paulo, Rio de Janeiro and Salvador).

Both of these structures would allow the investment project to borrow money or issue a bond that is off the sub-national government's balance sheet. For this to be viable it is important that the underlying investments have robust cash flows capable of servicing the loans.

We consider that the use of green bonds could play an important and beneficial role to assist sub-national governments' investment objectives. Green bonds' clarity towards how proceeds will be spent, offers investors greater certainty and transparency through the verification process that money is not misappropriated. Green bonds can also attract investment from a broader range of foreign investors that would not usually invest in sub-national Brazilian debt.



Accessing green financial markets: green bonds and loans

There is strong investor demand for green bonds, which are consistently oversubscribed. This rapidly growing market has the potential to help cities attract new investors interested in high-quality low-carbon and climate-resilient infrastructure investments. With the growth of climate related financial disclosure, investors and asset managers are driven to increase their exposure to green assets.

Recent experience suggests the price of the capital would be similar to that of conventional bonds with the same risk profile.²³ This reinforces the importance of ensuring that the corporate structure that builds and operates the infrastructure has a robust and reliable source of revenue. It might also be necessary to access development banks to provide credit enhancement to improve the project's financial viability.

Green City Bonds fund green projects in cities, and can be issued to meet the investment requirements for climate-friendly urban infrastructure, such as low carbon buildings, metro rail systems, wastewater treatment plants and renewable energy.

If you are an infrastructure company:

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, or infrastructure debentures in the local context, have accounted for most of Brazil's green bond market so far. Brazilian issuers have reaped the benefits of accessing investors looking for green, including reputational gains, and investor diversification.

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 also 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.

However, this has also meant that institutional investors have stayed clear of buying incentivised debentures given they are not eligible for the tax benefits. Also, government bonds offer a "safer" risk/return profile than most financial products available in Brazil. Although, with decreasing interest rates, and mandatory ESG integration recently approved for national Pension Funds, through resolution CMN 4.661/18, it is likely that institutional investors will begin searching for good financial products in order to further diversify their portfolios and comply with their fiduciary duty and local regulations.

For instance, ISA CTEEP, a private electric energy concessionaire responsible for transmitting approximately 25% of the energy produced in Brazil, issued in April 2018, R\$621mn in incentivised debentures labelled as green, to finance projects bided between October 2016 and April 2017.

In February 2018, Copasa, the concession company responsible for the water treatment and waste management in the state of Minas Gerais, issued R\$268mn in incentivised debentures. This was used exclusively for infrastructure projects of basic sanitation in the sewage system of the municipalities of Divinópolis and Sabará. Projects like these are likely to be eligible for green certification and benefit from a green issuance.

If you are a Municipality:

Climate Bonds Initiative is working with the Federal Government, through this project, in order to prioritise climate resilient infrastructure in concession portfolios as well as in external financing processes.

New projects should aim to consider climate change impacts, particularly regarding temperature rise and changes in precipitation patterns, over the assets' working lives when calculating maintenance costs and usable life.

Currently, in order to obtain external finance, Brazilian Municipalities require authorisation from the Ministry of Finance and approval from the Senate. The Commission for External Financing (COFIEX) then reviews the infrastructure proposals presented, including by the local governments, according to the government's priority sectors (divided into water and sanitation, R&D, environment, energy, urban mobility and development, and logistics and transport).²⁴

If emissions and climate resilience were also incorporated into these criteria, municipalities could leverage international investment looking for green assets. Municipalities could therefore take advantage of existing pools of capital seeking to invest in sustainable infrastructure, which will outperform fossil fuels and traditional forms of infrastructure, such as roads-based logistics.

Green pooled funding for municipalities

Pooled funding for municipalities can be an effective model for municipalities to access capital markets to finance urban infrastructure. The most effective and efficient pooled funding model entails aggregating municipalities' debt operations and creating an independent entity owned and/or backed by the municipality and/or central government.

Local government funding agencies (LGFAs)

Local government funding agencies (LGFAs) are a popular model in Northern Europe and are the largest municipal lender. The key advantages of LGFAs are:

- **Aggregation:** by gathering a large portfolio of projects, these financial institutions can raise large, international bonds.
- **Resources and expertise:** Centralizing resources and expertise enables the agency to develop and hire the appropriate expertise, overcoming the capability barrier which may exist at the municipal level.
- **Better debt pricing:** the ability to raise debt through capital markets and pass any pricing benefit onto the borrowers (and owners) can help municipalities access cheaper financing for infrastructure projects. Robust risk management and monitoring processes have also been a characterizing feature of LGFAs.

The Nordic countries (Denmark, Sweden, Finland, Norway) have demonstrated the viability of this model for financing green urban infrastructure. All the Nordic LGFAs have issued green bonds, with the largest issuer being Sweden's Kommuninvest (EUR2.3m) followed by Norway's Kommunbanken, with EUR 2.2bn issued.

Municipal bond banks

Municipal bond banks have been a dominant source of finance in the US and have also been developed in Mexico. These are banks owned and operated by state government agencies, set up with the purpose of lowering the cost of funding for municipalities. These banks issue general purpose on the capital markets and redistribute the proceeds to municipalities

Club deals

Alternative to creating an intermediate lender, municipalities can also cooperate through a so-called “club deals”, i.e. raise a bond through a common platform without creating an independent entity, leaving each participating municipality responsible for paying interests and capital. This structure would still enable municipalities that are not able to do so on their own, to access capital markets, but has less cost efficiencies compared to creating an LGFA.

At a minimum, and perhaps as a first step, municipalities can create a network to coordinate their borrowing activities and exchange best practices, including raising a green bond issuance through a pooled financing mechanism.

If you are a bank:

Green Finance also offers an opportunity for banks and other financial institutions which oversee lending portfolios for being allocated towards eligible assets, such as in the sectors above, renewable energy, energy efficiency, sustainable agriculture and others.

Bank of the Northeast (BNB):

The regional development bank, Bank of the Northeast, through their FNE Program, finances infrastructure portfolios from the Northeast region of Brazil, the North of the state of Minas Gerais and the state of Espírito Santo. In 2018, for infrastructure portfolios, the bank had an approved budget of R\$14.5bn²⁵ (approx. USD3.6bn), of which, by mid-August, R\$6.275bn was already loaned.

In July, 2018, the Bank provided a credit line of R\$164.7mn to Cagece, a company of mixed economy responsible for the water and sanitation systems in the state of Ceará. The funds were complementary to the total cost of project of R\$235mn for the improvement and expansion of the water supply systems in the municipalities of Fortaleza, Maracanaú and Pacoti.

Subnational development banks in Brazil, for example, could benefit from aggregating portfolios of loans to green projects/sectors, known as green tagging, and expand their lending capacity and therefore further benefitting municipalities.

Development banks aim to finance micro and medium-sized companies for project and program funding, and for the acquisition of machinery, equipment and working capital. They are able to issue bonds and other financial products as well as to collect third party resources through term deposits and international financing.

BNDES is the primary Federal source of development finance over the whole country. The Bank was founded in 1952, institutionalised by Law 1.628, and it works with its own statutory framework.

It is supported by the regional development banks, like the Bank of Northeast (BNB) and Minas Gerais Development Bank (BDMG).

The role of the development banks has become crucial to attract the private sector and enhance its partnership with the public sector, mostly within infrastructure financing. In a country where there is still need and space for development, within a world that has been searching for ways to gather financial resources and solutions to the development and implementation of the SDGs, Development Banks have the opportunity to be the link between sustainability and development.

Green Lending:

Green Lending and other credit facilities provided by financial institutions will function in the same way that traditional lending does, where the assets comprised in the loans or the projects being financed are eligible. For example, BNDES' and regional development banks' LED lighting credit lines could be considered a type of green lending. Financial institutions can therefore expand on the concept of green lending to provide more favourable conditions to green projects and assets. Nonetheless, 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.

Public and commercial banks can integrate green investment throughout their operations, where they can provide services on:

1. **Origination and funding**, such as structuring projects with government or

bank guarantees, funding projects directly, or arranging funding from other banks.

2. **Capital Raising**. This might involve issuing green bonds to institutional and retail investors or raising equity for special purpose investment vehicles.
3. **Working with government agencies** to find ways to reduce transaction costs and risk profiles of needed projects.
4. **Industry mobilisation**, in particular aggregating and packaging projects into investment vehicles suitable for institutional investors.
5. **Negotiating government guarantees**.
6. **Championing and facilitating low carbon investments**.
7. **Providing advisory services** for bond issuance.

Minas Gerais Development Bank (BDMG):

BDMG, the regional development bank of the state of Minas Gerais, has also already identified R\$64,5mn (approx. USD17mn) in sustainable lending towards infrastructure in its portfolio in 2017.²⁶

BDMG has a credit of R\$762mn funding infrastructure projects in 400 municipalities from Minas Gerais. Through the financing of the municipal projects, the institution also offers advice on the preparation of proposals and guidance on the necessary documentation, becoming the official structuring institution for concessions and PPPs in the state. For instance, the development institution partners with public consortia, like Consane, which is the regional consortium of basic sanitation, formed by 8 municipalities, for structuring the urban solid waste project in the municipalities, by contributing and accelerating the process of public notice for PPPs.

National Development Bank (BNDES):

BNDES was the first Brazilian Bank to issue a green bond. Their USD1bn bond was listed on the Luxemburg Green Exchange in May 2017 with a 4.75% coupon, lower than the 5.25% originally estimated. The bond sought to refinance the bank's solar and wind portfolios and the use of proceeds will also go towards renewables projects.

If you are a development entity:

Though the public sector will remain a key financier and a market driver in most of these sectors, it is important to think about innovative and blended financial structures which will allow for a greater impact of limited public funds. If further developed, these blended structures could overcome, or minimize, the following current challenges:

1. Country credit rating,
2. Currency fluctuations,
3. Provision of guarantees from the government,
4. Longer payback requirements,
5. Enforceability of urban projects' completion.

One of the strategies to manage these challenges is mobilizing a developing entity to support, at least in part, these projects' financing. A Multilateral Development Bank (MDB) is able to mitigate credit risk exposure, protect investors from extreme currency fluctuations, and, to an extent, the risk of non-payment of collaterals by a sovereign or sub-sovereign, through alternative products such as credit enhancement, or through backing the asset guarantees. Additionally, the provision of guarantees by a development entity can lower the costs of transactions, make the length of loan longer, as well as increase the scope of activities of a project.

The Concession and PPPs model is being largely used in Brazil to overcome budget constraints. MDBs attract private investment and domestic financial institutions, which together, may not have the capacity to offer longer tenure for projects with a long payback times. Therefore, the participation of development entities partially financing projects could enlarge the capacity for longer loans.

Another major problem for urban projects in Brazil is the risk of the municipalities' default and the breach of contract with their subcontracted private companies, which can be aggravated if the project involves the provision of infrastructure for basic livelihood, which, in this case, the contract cannot be easily interrupted by the latter. The participation of MDBs therefore could ultimately provide structures and products such as guarantees to mitigate, to a certain extent, the financial risks.

Attracting international investment:

Development entities can act as catalysts to enable green international investment flows into Brazil. Two of the main challenges in securing international finance for municipal infrastructure are:

- i. **obtaining a guarantee**, either for the debt itself or for the revenue stream, as in the case of PPPs;
- ii. **taking on the currency risk or providing the hedge**, mostly for extreme currency fluctuation.

Leveraging domestic capital:

There is also an opportunity to diversify the investor base towards infrastructure in Brazil through green finance. Most of Brazil's infrastructure is financed via BNDES, which can be used as a catalyst for private investment, both domestic and international.

Actions:

Public finance entities, especially development banks (multilateral, national and sub-nationals), can step in to provide these 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:

1. **Cornerstone investments:** where the public entity would take on a larger number of shares or quotas on a particular bond or fund;
2. **Structuring dedicated funds:** which will prioritise sustainable infrastructure investments such as the Sustainable Energy Fund launched by BNDES;
3. **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;
4. **Leveraging aggregation platforms:** in order to facilitate access for international investors, which are seeking for larger volumes, usually over 200mn hard currency. By supporting aggregation instruments such as financial securitizations, CRIs and LIGs, it is possible to bundle a number of infrastructure investments and therefore access institutional capital.²⁷
5. **Fostering innovative revenue streams, such as Land Value Capture (LVC):** a model which has been little explored in Brazil to date, where infrastructure investments trigger an increase in adjacent property values, which can be captured as part of the return on the infrastructure investment.

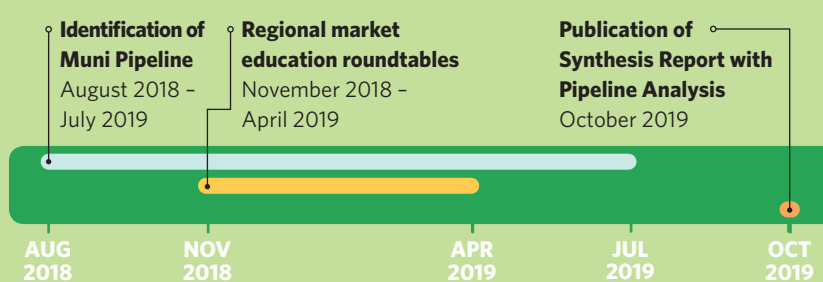
What next?

This project will carry out a number of local market education activities in the second half of 2018 and early 2019, with different partners. In parallel, Climate Bonds Initiative will also seek to identify a green infrastructure pipeline linked to Brazilian municipalities, to be included in the wider final report alongside a list of policy recommendations for unlocking investment potential.

In the meantime, what is needed:

- a. Capacity building across stakeholders;
- b. Adjustment of regulatory requirements, including the promotion of a standardized Green Tagging approach for project finance and integration of climate criteria;
- c. Building investor capacity and mobilization, for institutional and retail groups;
- d. Further exploring the role of MDBs, moving beyond loans, which can include: the development of FX products, political coverage and credit enhancement products.

Timetable



Notes

1. Between 2016-2030, according to [IFC, 2016](#).
2. [Painel Brasileiro de Mudanças Climáticas, 2017](#), pg.74
3. There are three main revenue streams; transfers from the federal government, transfers from state governments, and municipal tax revenues.
4. RSF 48/2007
5. Justen Filho, Marçal. Curso de Direito Administrativo. São Paulo: Saraiva, 2005. p. 549
6. Until September 2018
7. Brazil's NDC has been ratified by Congress and is now mandatory according to domestic legislation.
8. Instituto Trata Brasil.
9. Valor, 2018.
10. Governo Federal, 2017.
11. ABRELPE, 2015.
12. The National Waste Management Policy (PNRS - Law 12.305/10) establishes target and instruments to rollout effective waste management throughout the country. It instructs municipalities to end all dumps, to be effectively replaced by landfills and also mandates that waste is appropriately managed by: reusing, recycling, composting, and generating or recovering its energy potential.
13. IFC, 2016.
14. ANEEL, Resolução Normativa nº 819, 2018.
15. Climate Bonds Initiative
16. PlanMob-BH 2030.
17. Política Nacional de Resíduos Sólidos.
18. Comissão de Meio Ambiente conhece sistema de geração de energia em aterro - May, 2018,
19. Climate Bonds Initiative, 2018
20. IMF (April 2018) "World Economic Outlook database" data extracted 23 October 2018
21. Brazilian National Treasury (2017) "Fiscal Recovery Regime" slides to OECD
22. How to fix the fiscal crisis in Brazil's states?
23. Green Bond Pricing in the Primary Market: October - December 2017
24. COFIEEX Resolution 01-2017
25. Valor, August 2018.
26. BDMG, 2017.
27. Though it will be necessary to develop parallel structures for offshore issuance as currently international investors either are not able or face challenging tax requirements in order to invest in these products in Brazil.



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