Financing Climate Futures

RETHINKING INFRASTRUCTURE

Scaling up climate-compatible infrastructure

Insights from national development banks in Brazil and South Africa

CASE STUDY

OECD ENVIRONMENT POLICY PAPER NO. 18



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Financing Climate Futures

RETHINKING INFRASTRUCTURE

Governments recognise that scaling up and shifting financial flows to low-emission and resilient infrastructure investments is critical to deliver on climate and sustainable development goals. Efforts to align financial flows with climate objectives remain incremental and fail to deliver the radical transformation needed. The OECD, UN Environment and the World Bank Group, with the support of the German Ministry of Environment, Nature Conservation and Nuclear Safety, have joined forces under a new initiative – *Financing Climate Futures: Rethinking Infrastructure* – that provides a roadmap to help countries make the transformations in their infrastructure, investment and finance systems that are needed to make financial flows consistent with a pathway towards a low-emission, resilient future.

For more information on *Financing Climate Futures: Rethinking Infrastructure* visit: oe.cd/climate-futures

Scaling up climate-compatible infrastructure: Insights from national development banks in Brazil and South Africa

National development banks (NDBs) and development finance institutions – domestically focused, publicly owned financial institutions with a specific development mandate – are poised to play a role in bridging the investment gap for climate-compatible infrastructure in developing countries. But delivering on the Paris Agreement will require NDBs to transition from their traditional role as 'financer' to 'mobiliser' of investment for infrastructure, and to be better recognised in the international climate and development finance landscape. This paper highlights the role of NDBs drawing from case studies of the Brazilian Banco Nacional de Desenvolvimento Econômico e Social and the Development Bank of Southern Africa. As such, it provides important impetus to the international discourse on decisive climate action.

DISCLAIMER

This paper was prepared as a part of *Financing Climate Futures: Rethinking Infrastructure*, a joint initiative of the OECD, UN Environment and the World Bank Group, to help countries deliver on the objective of making financial flows consistent with a pathway towards low emissions and climate-resilient development. It was authored by the OECD and does not necessarily reflect the views of OECD member countries, UN Environment or the World Bank Group.

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Abbreviations and acronyms

AFD	Agence Française de Développement
BNDES	Banco Nacional de Desenvolvimento Econômico e Social
BRICS	Brazil, Russia, India, China, South Africa
BRL	Brazilian real (currency)
CCP	Climate Change Policy Framework
CDB	China Development Bank
DAC	Development Assistance Committee
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs
DRRF	Development Results Reporting Framework
DRT	Development Results Template
EAF	Environmental Appraisal Framework
EPC	Engineering, Procurement and Construction
ESS	Environmental and Social Safeguard Standards
FAT	Fundo de Amparo ao Trabalhador (Workers' Assistance Fund)
FDI	Foreign Direct Investment
FIDC	Fundo de Investimento em Direitos Creditórios
FINAME	Special Agency for Industrial Financing
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas emissions
GW	Gigawatt
IDB	Inter-American Development Bank
IDFC	International Development Finance Club
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
IRP	Integrated Resource Plan
KPI	Key performance indicator
MDB	Multilateral development bank
MW	Megawatt
NDB	National development bank
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
PASEP	Programa de Formação do Patrimônio do Servidor Público
PIS	Programa de Integração Social
PPP	Public-private-partnership
PRSA	Social and Environmental Responsibility Policy
REDD+	Reducing emissions from deforestation and forest degradation
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
SADC	Southern Africa Development Community
TLP	Taxa de Longo Prazo
UN	United Nations
USD	United States dollars
ZAR	South African rand (currency)

Executive summary

Meeting the 2030 Agenda will require developing countries to make a decisive transition towards low-emission, climate-resilient development pathways. This, in turn, calls for mobilising much larger volumes of public and private capital, and for existing investments to shift towards climate-compatible alternatives. Development banks and development finance institutions are key players in this transition. National development banks (NDBs) from major emerging economies such as Brazil, India, Indonesia, China and South Africa are poised to play a greater role.

This work aims to add to the literature on the role of NDBs in helping their governments to scale up climate action. It shares insights from in-depth case studies of the Brazilian Banco Nacional de Desenvolvimento Econômico e Social (BNDES) and the Development Bank of Southern Africa (DBSA). It was prepared as part of the joint OECD-UN Environment-World Bank Group initiative "Financing Climate Futures", and complements the 2018 report on the initiative (OECD, UN Environment and World Bank Group, 2018[1]).

KEY FINDINGS

While NDBs differ in scope, size and remit, they are individually and collectively crucial actors within the sustainable development and climate agendas. The value added of NDBs lies in their proximity to policy makers, local markets and local contexts; their ability to provide financing in local currency; and their role in intermediating international development finance.

Brazil and South Africa face similar challenges in infrastructure promotion: while the quality of infrastructure and infrastructure services needs to improve, public finance is limited and needs to be used strategically in order to mobilise commercial capital.

The case study institutions in this report – BNDES and DBSA – are important actors in the context of national economic development and infrastructure development, and have played a critical role in promoting renewable energy and other low-carbon technologies. They are now ready to move beyond their traditional focus on direct financing of infrastructure, towards a more catalytic role in promoting the climate-compatible infrastructure required for sustainable development The case studies highlight the need for action in three main areas – these recommendations could equally apply to NDBs in other developing and emerging economies:

1. Ensure clear mandates, strategies and tools for climate action

Both BNDES and DBSA have started to put policies and strategies to support environmental and climate mainstreaming into action to increase their green finance and to shift portfolios towards climate-friendly investments. Going forward, a clear focus on financing the implementation of current Nationally Determined Contributions (NDCs) and providing the basis for more ambitious subsequent NDCs could help NDBs scale up green and climate finance.

2. Make the shift from financer to mobiliser of investment for infrastructure

Spurred by national awareness of the limits to public finance and the need for more infrastructure investment, both BNDES and DBSA are transitioning from their traditional role as providers of long-term finance for infrastructure promotion to mobilisers of other sources of finance. This involves increasingly positioning themselves as enablers that (1) carry risks not readily assumed by the private sector; (2) improve the risk-return profile of infrastructure investment to mobilise commercial capital; and (3) catalyse

markets through a programmatic approach of taking nascent climate solutions to market and demonstrating project viability.

3. Ensure support from governments and the international climate finance community

Both BNDES and DBSA are backed by their governments, and their financing is directly influenced by government plans and policies. In addition to strengthening mandates for climate action, and assigning NDBs with a clear role in national climate policy discussions, direct financial support from the government will enable NDBs to create markets for low-carbon technologies. Access to international climate finance – for example, through the Green Climate Fund – is also seen as a driver of climate action through NDBs.

1. Case study findings: What role for national development banks in scaling up climate-compatible infrastructure?

1.1. Introduction

Sustaining growth in developing countries will require a boost in new infrastructure development in the coming years. Ensuring that all new infrastructure is low-emission and climate-resilient, i.e. climate-compatible, will be critical to safeguard the development gains of past decades, and to avoid locking countries in to emissions-intensive development pathways. But this will require much more investment. The Organisation for Economic Co-operation and Development (OECD) estimates that, globally, USD 6.9 trillion will be required every year until 2030 to provide low-carbon, climate-resilient infrastructure (OECD, 2017[2]). This will mean mobilising large volumes of commercial capital, which, in turn, will require strong enabling policy environments that encourage investors to engage. As these frameworks evolve, public climate and environmental finance will need to be used strategically to build markets for climate-smart technologies and to de-risk projects to attract commercial investors.

Development banks and development finance institutions (DFIs) – publicly owned financial institutions with a specific development mandate – are key actors in infrastructure financing in developing countries and can help mobilise commercial capital for infrastructure. Among these institutions, national development banks (NDBs) from major emerging economies such as Brazil, China, South Africa and Mexico are rising to the forefront of international discussions. To bridge the investment gap for climate-compatible infrastructure, however, these banks will need to move beyond their traditional role of financing projects and companies, and start to attract commercial investors to projects through approaches such as blended finance.1

This work aims to add to the literature on the role of NDBs in supporting their governments to scale up climate and green finance, and specifically, to share insights into how individual NDBs are embracing this role. It includes case studies of two banks – the Brazilian Banco Nacional de Desenvolvimento Econômico e Social (BNDES) and the Development Bank of Southern Africa (DBSA) – illustrating the role they play in financing climate-compatible infrastructure in Brazil and South Africa, and highlighting what is needed to strengthen their role going forward. The work was prepared as part of the joint OECD-UN Environment-World Bank Group project Financing Climate Futures, and complements the main project report, Financing Climate Futures: Rethinking Infrastructure (OECD, UN Environment and World Bank Group, 2018[3]).

The structure of this OECDC Environment Policy Paper is as follows. This first chapter provides an overview of the findings of the two country case studies, including recommendations for strengthening their role. The second chapter outlines the context and highlights the general importance of NDBs for developing and emerging economies. The third and fourth chapters present detailed case studies of BNDES and DBSA, providing an overview of both institutions, their roles in their national contexts, as well as the banks' policies and strategies, and spotlighting innovative projects and funds.

1.2. Why do national development banks matter, and why now?

Globally, the development finance landscape is changing and the largest volumes of financing for development now originate domestically. Amidst this, NDBs in developing countries are important actors who support the development priorities of their governments, especially in areas where private finance is not available (Studart and Gallagher, 2016[4]); (Lorenzo and Netto, 2013[5]).

The relevance of these banks for sustainable development lies in their collective financial footprint, their trusted role in delivering the policy mandates of their governments, and their ability to take a countercyclical role to support their economy. While most NDBs in developing countries have relatively small financial footprints (De Luna-Martinez et al., 2018[6]), some are significant, and collectively these banks represent significant volumes of finance. For example, members of the International Development Finance Club (IDFC), which include national and sub-regional financing institutions as well as some bilateral finance institutions, are estimated to have total assets of USD 3.7 trillion, more than double the combined assets of the multilateral development banks (MDBs). Over 90% of the total assets of IDFC members are attributed to four NDBs: China Development Bank, KfW, BNDES and Korea Development Bank (Morris, 2018[7]).

Harnessing the activities and influence of these institutions will be critical for making a decisive transition towards low-emission, climate-resilient pathways in developing countries. The cases of BNDES and DBSA clearly demonstrate this.

Despite their differences, BNDES and DBSA are key for national economic and infrastructure development

BNDES and DBSA differ significantly in the size of their portfolio relative to their national economies, as well as in the sectors and scope of their financing. BNDES is one of the largest development banks in the world, with total assets estimated at 13% of Brazil's GDP in 2017, and a relatively broad portfolio covering most economic and social sectors. DBSA is smaller and specialises in infrastructure finance. It is one of three NDBs in South Africa. DBSA's total assets are estimated to be equivalent to 2% of South Africa's GDP in 2017.

Despite these differences, both banks play key roles. BNDES is responsible for an estimated 70%-80% of total infrastructure financing in Brazil over the last 10 years (Yokota et al., 2017[8]). DBSA has a major focus on transport, and is an increasingly important actor in the Southern African Development Community (SADC), with 30% of its disbursements in 2017 made within this region (and outside South Africa).

BNDES and DBSA are helping deploy low-carbon infrastructure

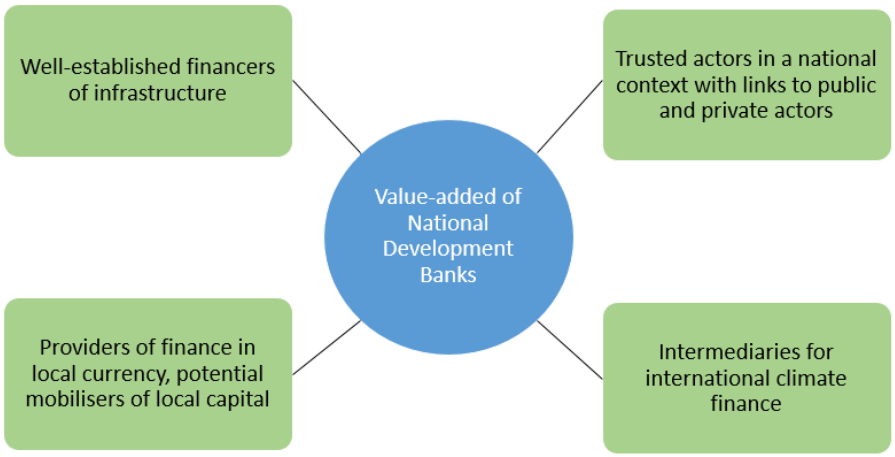
As the government's main instrument for long-term finance, BNDES is often implicitly a key implementer of government policy and plans on the environment. It manages the Amazon Fund – Brazil's main national and regional REDD+ (reducing emissions from deforestation and forest degradation) financing mechanism – and was instrumental in making Brazil's wind power industry a cost competitive renewable energy source by financing wind power across the country. Similarly, DBSA has played an important role in supporting South Africa's transition to a green economy by managing the Green Fund of the Department of Environmental Affairs. DBSA and other state-owned actors have also helped drive infrastructure development. DBSA's support for setting up South Africa's Renewable Energy Independent Power Producer Procurement Programme, and subsequent financing for projects within the programme, highlights its relevance for implementing the government's renewable energy plans (see Box 4.3). It also demonstrates how a blended finance approach, embedded in a government plan, can drive the development of financially viable markets for renewables over a short time span.

BNDES and DBSA highlight how NDBs add value in financing climate change

The added value of NDBs in supporting climate-compatible infrastructure and in reducing the barriers to scaling up commercial finance is similar to that of other development banks. They are well-established financers of infrastructure, they help build markets for clean technologies in their countries, and they can scale up efforts to mobilise and attract commercial finance. In addition, they have specific comparative advantages over international development banks (Figure 1.1) (Smallridge et al., 2013[9]).

- **Proximity to local markets and being embedded in the national context**. BNDES and DBSA are both a part of the local financing context, and work directly with government institutions at national and regional level, municipalities, local financial institutions and companies in Brazil and South Africa. DBSA, for example, has a specific mandate to work with underserved municipalities on infrastructure issues relating to planning and service delivery, with 62% of disbursements in 2016-17 going towards this area.
- **Providing financing in local currency**. Both banks provide financing in local currency, can mobilise and "crowd in" additional local private sector finance and help develop capital markets.
- **Intermediating international development and climate finance**. BNDES and DBSA work with international financial institutions and with climate funds to channel development finance to local projects. BNDES has partnered with MDBs and bilateral banks (such as KfW) to support low-carbon transport and renewable energy projects (see Box 3.1). DBSA is accredited under the Green Climate Fund (GCF) and the Global Environment Facility (GEF), and recently had its first GCF proposal approved for financing. The DBSA Climate Finance Facility, a proposed blended finance structured debt facility, will support infrastructure in the SADC region (see Box 4.2).

Figure 1.1. The strengths of NDBs in supporting low-emission, climate resilient infrastructure



1.3. How to harness NDBs' ability to mobilise financing for climate-compatible infrastructure?

Brazil and South Africa both face a dual challenge in infrastructure promotion. On the one hand there is a need to improve the quality of their energy, transport, and water and sanitation infrastructure and the services they provide. On the other hand, within a context of limited public budgets and fiscal constraints, there is a need to use public finance strategically to mobilise commercial capital for infrastructure. Meeting both challenges is an opportunity to make a decisive transition towards climate-compatible development. Due to the long-lived nature of infrastructure assets, shifting existing financing towards low-emission

choices, and mobilising additional finance from commercial investors, will help Brazil and South Africa avoid being locked in to emissions-intensive development.

Ensure clear mandates, strategies and targets, and tools to support climate action

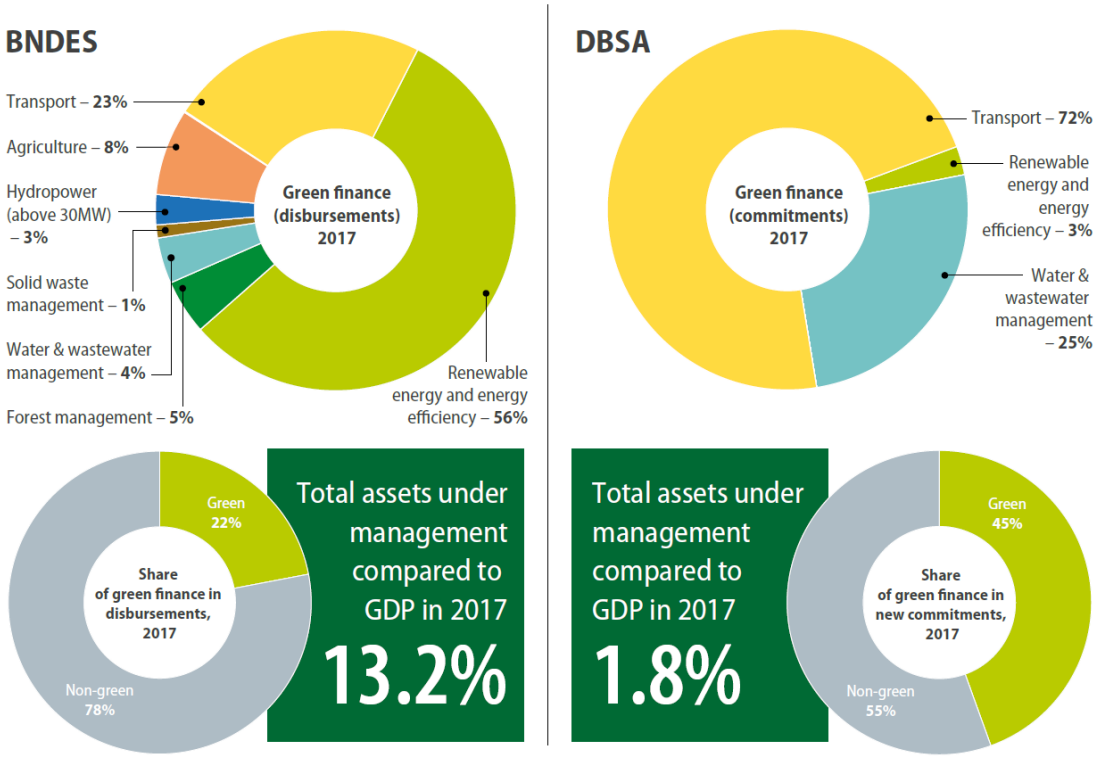
Development banks need strong, coherent mandates to deliver transformative climate action alongside their other economic and social policy objectives (Lorenzo and Netto, 2013[5]). Strong mandates, however, are not enough. They must be supported by integrating climate with other development objectives, and reflecting this in corporate scorecards. Training and awareness raising are needed to incentivise staff to finance climate-related projects, backed by staff incentive systems to scale up climate action. As demonstrated by the MDBs and bilateral development banks, such as the French development agency (AFD) and KfW, a public commitment and measurable climate goals can help development banks maintain their momentum on climate finance, and garner support from the government as well as international actors.

Both BNDES and DBSA have policies and strategies in place to support environmental and climate mainstreaming and help shift their portfolios towards climate-friendly investments. They have started putting these into action. BNDES does not have an explicit climate change strategy, but environmental sustainability is a clear focus in its recently revised mission and strategy. In addition, the bank ceased financing conventional thermal power plants in October 2016 to underscore its willingness to drive Brazil's climate efforts (Faria and Angelo, 2016[10]). Under its Social and Environmental Responsibility Policy (PRSA 2018-2020) BNDES aims to formalise its public commitment and targets to deliver Brazil's Nationally Determined Contributions (NDCs) under the Paris Agreement.

DBSA's recently adopted Climate Change Policy Framework clarifies the bank's role in contributing to South Africa's NDC and sets a climate finance target for the organisation of a minimum of 35% of annual lending by 2022 (with sub-targets of 70% for mitigation and 30% for adaptation). The bank has also developed a detailed reporting framework for all development aspects, including climate change, and an approach to integrate climate considerations into each stage of the project cycle. Given South Africa's historical reliance on coal-powered energy and consequent sensitivity concerning the transition to low-carbon development, DBSA's efforts clearly highlight that despite the real trade-offs facing NDBs, integrated action on climate and infrastructure can be pursued.

These strategies are allowing BNDES and DBSA to deliver and increase their green and climate finance (Figure 1.2). Despite a decrease in overall disbursements in the last few years, BNDES has maintained or even increased its share of green economy-related financing. Green economy-related disbursements made up 22.5% of the bank's total disbursements in 2017, and have increased year-on-year from 13.4% in 2012 (BNDES, 2018[29]). For DBSA, green finance represented 44.5% of all its commitments in 2017, the majority of which (33%) were for the green economy and climate change mitigation. Note, as Figure 1.2 presents disbursement figures for BNDES and commitment figures for DBSA it is not possible to compare the green finance of both banks.

Figure 1.2. Key facts about BNDES and DBSA green finance in 2017



Source: Authors, based on annual reports and data provided by BNDES and DBSA.

Going forward, BNDES and DBSA must scale up climate finance still further to help meet and go beyond their countries' NDCs. This must be facilitated by developing tools and approaches to integrate climate considerations into their portfolios (OECD/UN Environment/World Bank Group, 2018[11]). For example, several MDBs have put in place climate risk-screening tools to help identify climate-related risks and introduce adaptation measures into project design. International financial institutions are also introducing shadow carbon prices and are accounting for the carbon impact of their financing to discourage the financing of emissions-intensive technologies and approaches. Many development banks have now started analysing to what extent their portfolios are aligned with the goals of the Paris Agreement; i.e. whether their financing actively supports climate goals, or at the very least, does not undermine their achievement. Some banks – such as AFD – have committed to ensuring all their activities are aligned. Such efforts also need to be supported by strengthening staff capacity in this area and ensuring adequate resources to continue mainstreaming environment and climate change into banks' work.

Shift from financer to mobiliser of infrastructure investment

Spurred by national awareness of the limitations of public finance and the need for more infrastructure investment, both BNDES and DBSA are transitioning from their traditional role as providers of long-term finance for infrastructure to enablers and mobilisers of other sources of finance.

DBSA has clearly recognised the importance of this transition and has recently adopted a corporate target for finance catalysed as a result of their operations. Importantly, this target prioritises not just finance provided by DBSA, but also total disbursement of the portfolio of projects in which DBSA is invested. Its Climate Finance Facility, recently approved for financing by the Green Climate Fund (GCF), is an example of how DBSA can support the mobilisation of commercial finance (see Box 4.2). The facility is based on a

blended finance structure that will crowd-in commercial capital by improving the risk-return profile of commercially viable climate projects in local currency that are not able to self-fund in the market.

BNDES's new mission recognises the importance of its existing work on capital market development. In May 2017, BNDES issued a USD 1 billion green bond – the first international green bond to be issued by a Brazilian bank. Another example is the bank's BRL 500 million (USD 144 million) Sustainable Energy Fund, which builds on an established securitisation framework. Through this fund, BNDES finances the construction of sustainable energy projects and securitises the less risky operational phase of sustainable energy projects. These are promising indications of how BNDES can and will need to continue to mobilise additional finance. This is especially important considering the changes to its pricing and funding structure, in which the bank is moving from its current model of providing concessional financing for projects to providing financing at market rates.

Going forward, both banks will need to scale up these efforts and mainstream them across their operations. Developing financial instruments and approaches to support the scale up of new technologies will continue to be key. In addition, both banks will need to increasingly position themselves as enablers by (1) carrying risks not readily assumed by the private sector; (2) improving the risk-return profile of infrastructure investment to mobilise commercial capital; and (3) catalysing markets through a systematic approach of taking nascent climate solutions to market and demonstrating their viability.

Use government and international climate finance support to drive action

Governments and the international climate finance actors are important influencers and supporters of NDBs, both through their policy and planning signals, as well as by providing capital and concessional finance. As national financial institutions, BNDES and DBSA are backed by their governments, and their financing is directly influenced by government plans and policies. A more formalised recognition of their role in the institutional framework for climate action could encourage a stronger focus on NDC implementation.

Direct financial support from the government also plays a key role. In the case of BNDES, the introduction of a new benchmark interest rate (TLP) at which the bank borrows money from the government is driven by government efforts to diversify sources of funding for infrastructure, including from commercial sources and capital markets. To carry forward efforts to build markets for low-carbon technologies, BNDES will have to continue to support new technologies which do not yet have a market in Brazil, as it has done for the wind industry in past years. Access to concessional finance will remain key, especially for supporting the solar industry which is not yet as cost competitive in Brazil as in other countries (Andreão, Michelle and Miquel, 2017[12]). It will also be key for promoting energy efficiency, which often requires accompanying technical assistance to conduct energy audits and establish the business case.

International climate finance can also drive climate action. For example, DBSA's GEF and GCF accreditation played a key role in mainstreaming climate change within DBSA, overhauling the bank's environmental and social safeguards policy, and creating the bank's climate change policy framework. More generally, evidence from implementing the Clean Technology Fund (CTF) in developing countries illustrates the role of climate finance in supporting NDBs to improve the cost-competitiveness of renewable energy. In Mexico, for example, long-term concessional support from the CTF and the Inter-American Development Bank (IDB) allowed the Mexican NDB Nafin to offer long-term financing to wind projects, which helped to develop the commercial project finance market for wind in Mexico (Bloomberg New Energy Finance, 2019[13]). Greater recognition of the role of NDBs is needed in the international climate finance architecture, especially when it comes to accessing international public climate finance.

2. Overview of national development banks and climate-compatible infrastructure

2.1. The challenges of financing climate-compatible infrastructure in developing countries

Developing countries face the dual challenge of scaling up infrastructure investment while ensuring this investment is better allocated towards sustainable infrastructure choices that help deliver social, environmental and economic sustainability. The latest progress report by the UN Secretary General on the achievement of the Sustainable Development Goals shows that global poverty has declined rapidly, dropping to one-third of 1990 levels in 2013, but that even so, 783 million people still lived in poverty in 2013 (UN Economic and Social Council, 2018[14]). It is the poorer populations and communities that are often the most vulnerable to the impacts of a changing climate; without decisive action, worsening climate impacts could drive more than 100 million people into poverty by 2030 (Hallegatte et al., 2016[15]). Bridging the infrastructure investment gap will require all sources of finance to be harnessed and rapidly scaled up. Public finance will continue to play a critical role, but private capital will have to be mobilised at a new scale and speed to finance low-carbon, climate-resilient infrastructure systems, especially in the developing world.

Even without considering climate change, current institutional investment in infrastructure is low. The OECD estimates that investment in infrastructure represented 1.1% of the total assets under management by institutional investors in 2015, and that only a few funds are investing in emerging markets (OECD, 2018[16]). Infrastructure investment faces several barriers in attracting long-term finance from institutional sources: among other issues, infrastructure investment is capital-intensive and usually requires long-term finance; it is context-specific and complex; and it is often associated with information asymmetries, unreliable revenues and illiquidity (OECD, 2017[17]). In emerging economies, foreign investors are deterred by the high risks (both real and perceived) associated with infrastructure investments, such as foreign currency risk. And investments in low-emission infrastructure face an additional layer of barriers. Many of these projects entail higher up-front costs than conventional alternatives, they are associated with greater technology-related risks due to unproven underlying green technologies and are exposed to higher political risk due to their dependence on government support (Fay et al., 2015[18]). These challenges lead to a lack of commercially bankable projects in most developing countries.

2.2. Development banks and financing institutions as potential game changers

In general, while many different public and private actors will need to be mobilised to meet the infrastructure challenge in developing countries, development banks and development finance institutions (DFI) are key. Broadly defined as “publicly financed institutions with a specific development mandate”, these

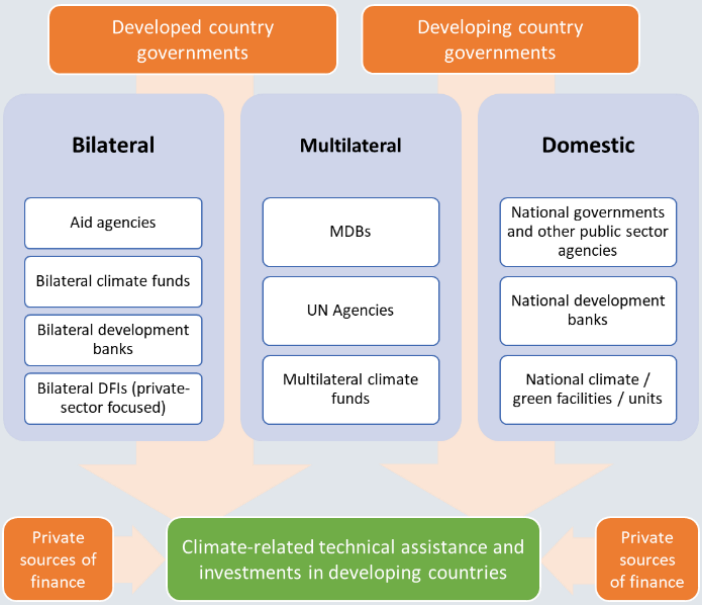
organisations are not a homogenous group but include a wide range of organisations with different mandates, geographies and target recipients (Box 2.1).

At the simplest level, development banks and DFIs can be categorised into two main groups based on where they operate: national development banks (NDBs), which operate in a domestic setting; and multilateral and bilateral development banks, which operate in an international setting. While the focus of this Policy Paper is on the former, i.e. NDBs, many of these institutions work closely with each other, and form a supply chain of financing for development. The way international climate finance is delivered offers an illustration of this (Figure 2.1).

Box 2.1. The "value chain" of development banks and finance institutions in financing climate

Different groups of development banks and DFIs play complementary roles in delivering climate finance (Figure 2.1).

Figure 2.1. The complementary role of public and private actors in international climate finance



Source: adapted from Venugopal et al. (2012[19]), Public Financing Instruments to Leverage Private Capital for Climate-Relevant Investment: Focus on Multilateral Agencies, www.wri.org/project/climate-finance-private-sector.

Multilateral development banks (MDBs) and **bilateral development banks,** backed by strong credit ratings and shareholder support, finance public and private projects, and bring knowledge and experience from different regions. MDBs usually include both public sector and private sector operations, and sometimes these work as separate institutions e.g. the International Finance Corporation (IFC) within the World Bank Group.

Bilateral development finance institutions (DFIs) can be specialised and "private sector-oriented", like the UK's CDC Group, the US's Overseas Private Investment Company and France's Proparco. These finance the private sector to help create markets and spur growth, and increasingly encourage the engagement of commercial investors.

National development banks (NDBs) – like the Banco Nacional de Desenvolvimento Econômico e Social (BNDES) in Brazil and the Development Bank of Southern Africa (DBSA) – are domestic institutions with knowledge of and connections to local markets and actors.

Source: (OECD/UN Environment/World Bank Group, 2018[11]), *Financing Climate Futures: Rethinking Infrastructure*, https://dx.doi.org/9789264308114-en

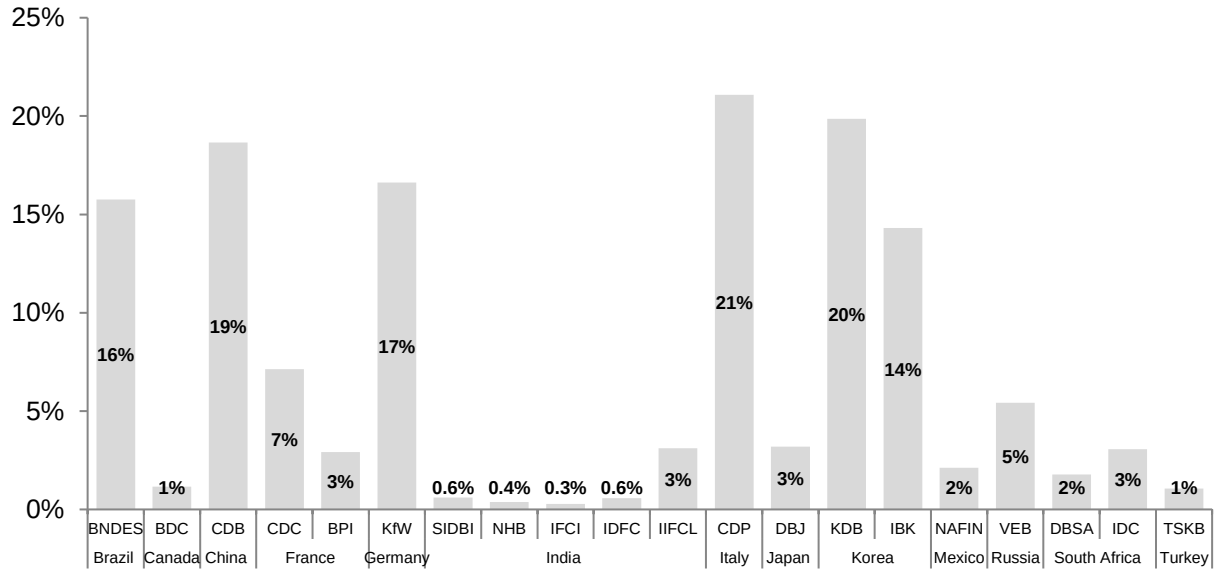
Among the different types of development banks and DFIs, however, many are established financers of infrastructure, and this role can be further strengthened to support and mobilise investment in low-emission, resilient infrastructure (OECD, 2017[17]).

Large and small NDBs will be important in the transition to low-carbon, climate resilient infrastructure

Publicly owned and supported, NDBs differ from other national financing institutions due to their specific development or policy-related mandates. NDBs are present in developed and developing countries alike, and it is estimated that there are more than 250 NDBs worldwide (OECD, UN Environment and World Bank Group, 2018[1]). Individually the size of NDBs varies significantly. Only a few are very large institutions – the majority of NDBs are relatively small actors within their national contexts (Figure 2.2).

Figure 2.2. Most of the G20 NDBs are small, 2015

Total assets as a percentage of national GDP



Note: BANOBRAS (Mexico) has been excluded from this figure due to lack of data
Source: (OECD, 2017[17]), "Mobilising financing for the transition", in *Investing in Climate, Investing in Growth*, https://dx.doi.org/10.1787/9789264273528-9-en

Despite their generally small size, these institutions already have a major influence on development and infrastructure, and on the climate-related plans and policies of their governments (see Chapter 1). While the majority of NDBs are small, they play an important role in development due to their mandates and proximity to government policies and plans. This role can be leveraged further to support climate-compatible development projects. A recent global survey of NDBs shows that, irrespective of their stage

of economic development, globally, governments are setting up NDBs with the aim of financing projects that the private sector is unwilling to finance, either at a very broad, multi-sector level, or in specific niche markets (De Luna-Martinez et al., 2018[20]). As a result, NDBs either have a broad mandate covering several sectors and types of actors; or a narrow mandate directed towards a specific area such as infrastructure, agriculture or small and medium-sized enterprises. Irrespective of mandate, NDBs can play an important countercyclical role, providing credit to compensate for a temporary reduction in loans from private sector financial institutions during times of economic downturn (De Luna-Martinez et al., 2018[20]). In addition, while the general client base of NDBs varies, they largely finance the private sector, targeting both small and medium-sized enterprises (SMEs) as well as bigger companies, in addition to state-owned enterprises, local governments and households.

Three reasons why development banks and development finance institutions are important

The value added of development banks and DFIs is rooted in the three key roles they can, and do, play in developing bankable projects and mobilising resources (OECD, UN Environment and World Bank Group, 2018[3]):

1. **As financiers of infrastructure:** Development banks provide concessional and non-concessional finance for greenfield low-carbon, climate-resilient infrastructure projects in developing countries. These projects provide a proof of concept for specific technologies and investments, and business models, in new markets. They also have the potential to be refinanced later in the project cycle by commercial investors.
2. **As mobilisers of commercial and other resources:** Development banks can attract commercial investment to projects by improving the risk-adjusted returns from renewable energy and sustainable transport projects through risk mitigation tools and approaches. They also act as intermediaries in blending finance from donor governments and investors to scale up commercial investment (OECD, 2018[21]).
3. **As "market makers", encouraging policy reforms and building project pipelines:** Development banks support governments in reforming core climate and broader investment policies and stimulate the creation of markets to scale up climate action. They can help governments in planning their infrastructure and developing project pipelines, conducting demonstration projects to illustrate viable green business models, and helping scale these up through targeted project development support. They can also pursue dialogue on policy reform with governments, helping to remove specific barriers to investment.

Development banks also play an important part in building capacity – institutional and technical – among government and other public sector agencies and private sector actors. This support underpins the three roles outlined above.

2.3. The unique role of NDBs in a shifting development finance landscape

Among development banks, NDBs are uniquely positioned to support transformative climate action. The development finance landscape has changed rapidly in the last few decades, with many different actors and sources of finance contributing significantly to development goals in developing countries. Box 2.2 highlights the increased role of emerging economies in financing development. Amongst the various development actors, NDBs – particularly those from emerging economies – are set to play an increased and potentially transformational role in scaling up finance low-carbon, resilient infrastructure.

Box 2.2. Emerging economies are increasingly important actors in financing for sustainable development

The OECD's Global Outlook on Financing for Development highlights some key trends in the role played by emerging economies domestically, as well as external sources of public and private finance, in the rapidly evolving landscape of financing for sustainable development:

1. **Most financing for development originates domestically**. National governments and domestic sources of finance remain the central pillar for financing development in developing countries. Tax revenues, for example, are estimated at USD 4.2 trillion in 2016, more than twice the volume of all cross-border flows.
2. **Emerging economies are an important source of external public finance**. Among bilateral sources of official development finance, South-South co-operation flows from ten major countries outside the OECD Development Assistance Committee (DAC) were estimated at USD 6.9 billion in 2015, compared to USD 5.2 billion in 2011.
3. **Emerging economy investors are also increasingly important as investors in other developing countries**. For example, developing country investors accounted for around 25% of global foreign direct investment (FDI) outflows in 2014, and Chinese-backed mergers and acquisitions-related investments accounted for 20% of all these investments in developing countries.

In emerging economies and developing countries, NDBs and other publicly supported financial institutions (such as export credit agencies and state-owned banks) are key channels for delivering both domestic and cross-border finance.

Source: (OECD, 2018[22]), *Global Outlook on Financing for Sustainable Development 2019: Time to Face the Challenge*, http://dx.doi.org/10.1787/9789264307995-en.

NDBs' added value in helping countries transition to low-carbon, climate-resilient development pathways is the same as for other development banks: they support infrastructure finance, mobilise other resources and work with the government to build markets and project pipelines. But in addition, NDBs have some unique features to offer (Abramskiehn et al., 2017[23]); (Smallridge et al., 2013[9]):

- **Proximity to the market**: due to their closeness to market actors and long-lasting relationship with public and private actors, NDBs are in a unique position to understand country-specific bottlenecks to low-carbon, climate-resilient infrastructure investments.
- **Local currency finance**: NDBs can borrow and lend in local currency, and can mobilise and "crowd in" additional local private sector finance and help develop capital markets.
- **Intermediation**: NDBs can work with MDBs and bilateral development banks to channel international finance for climate and other environmental objectives towards local projects. Several NDBs are also now directly accredited to the Green Climate Fund and can help their countries access GCF resources to support transformative climate investments.

More information is needed on NDBs' support for low-carbon, climate-resilient infrastructure

While there has been much debate in the international community on the role of multilateral and bilateral development banks in supporting the Paris Agreement and mobilising finance for infrastructure, the focus on NDBs has been relatively limited. Similarly, in the context of international efforts to promote the "billions to trillions" agenda, there has been less focus on how NDBs can help mobilise private and commercial financing, such as through blended finance approaches.

One factor underpinning this is the lack of easily available information on NDBs' financing and the extent to which they support environmentally friendly projects. In their global survey of NDBs (De Luna-Martinez et al., 2018[6]) found that only 56% of NDBs surveyed had a dedicated monitoring and evaluation unit in place, and that most NDBs only report on financial performance, with less emphasis on tracking support for development outcomes and results.

Some inroads are being made in this area. Members of the IDFC have developed a harmonised framework for tracking climate and green finance, and recent reports indicate this financing to be significant. In 2016, for example, IDFC members committed USD 173 billion in green finance, including USD 159 billion in climate finance and USD 14 billion in finance for other environmental objectives. The major share of this finance stemmed from institutions based in non-OECD countries (IDFC, 2017[24]).

Individual studies also demonstrate that NDBs are already playing an important role in regional and national contexts. A detailed assessment of public and private climate finance for projects in South Africa between 2010 and 2015 found that national development and other public banks – like DBSA and the Industrial Development Corporation of South Africa – played a major role, mobilising 64% of the USD 10.1 billion in private co-finance in these projects (McNicoll et al., 2017[25]). It also found that NDBs from other emerging economies (such as CDB) mobilised 17% of the private co-financing in 2014-15. Similarly, a study of Latin America found that 12 domestically focused institutions in Brazil, Chile and Mexico provided USD 11 billion in climate-related financing in 2015, the majority of which went to infrastructure sectors, and supported the scale up of private investment (Abramskiehn et al., 2017[23]).

3. Climate-compatible infrastructure in Brazil: the role of BNDES

Scaling up and improving the environmental performance of investment overall could support sustained economic growth in Brazil, reinvigorate social progress and contribute to the fight against climate change. National development banks (NDBs) have historically played an important role in the country, serving as a crucial locator of long-term financing on behalf of the government. Within this context, the Brazil's Banco Nacional de Desenvolvimento Econômico e Social (BNDES) has stood out over the years as an important means of implementing development policy in Brazil, and more recently, in implementing the government's environmental and climate policy directions.

This chapter presents an overview of BNDES and illustrates its role in supporting climate-compatible infrastructure in Brazil. It outlines the overarching policy and finance landscape for infrastructure; describes BNDES' financing, approaches and project case studies; and shares insights into BNDES' role in supporting climate-compatible infrastructure.

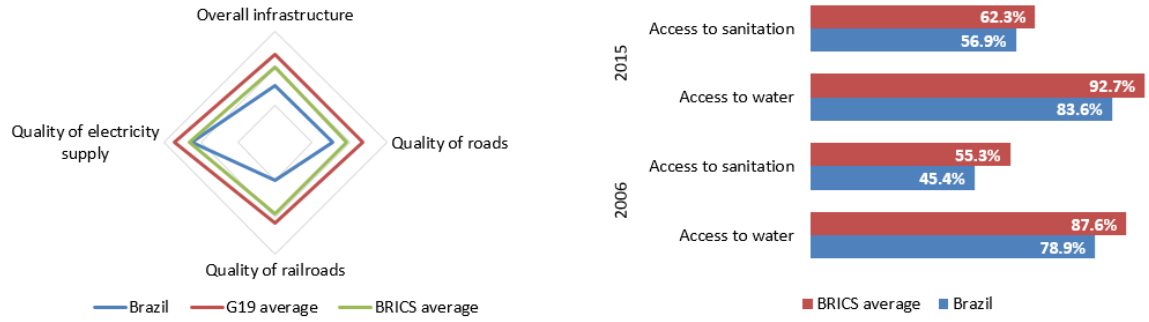
3.1. Challenges and opportunities in financing climate-compatible infrastructure

Linking climate-compatible infrastructure to growth

Infrastructure is one of the Brazil's key structural obstacles to sustainable growth. Since the 1980s, infrastructure investment in Brazil declined from 5.4% of GDP to an average of 2.0% of GDP between 2001 and 2015 – a level that is barely enough to cover depreciation (Raiser et al., 2017[26]). In comparison, China and India significantly increased their infrastructure stock between 1990 and 2010 (Raiser et al., 2017[26]), and invested on average 6.8% and 5% of GDP respectively in infrastructure between 2010 and 2014 (ADB, 2017[27]). The Global Competitiveness Report shows that transport infrastructure in Brazil, in particular, is perceived to be inferior to the other BRICS countries[2] (World Economic Forum, 2006[28]); see Figure 3.1. Similarly, while access to safe water and sanitation facilities has substantially improved in recent decades, it is still lower than in all the other BRICS, except India (see right hand column of Figure 3.1).

Figure 3.1. Brazil's infrastructure quality performs poorly compared to peers

Perception of the quality of overall infrastructure, roads, railroads, electricity supply in 2016 (left hand column), and access to sanitation and water in % in 2006 and 2015 (right hand column)



Note: G19 average includes the G20 except the European Union
Source: (World Economic Forum, 2006[28]), *The Global Competitiveness Report 2017-2018*, www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf; (IBGE, Pesquisa Nacional por Amostra de Domicílio, n.d.[29]), *Séries Históricas e Estatísticas - Desenvolvimento Sustentável, Indicadores Ambientais e Sociais*, https://seriesestatisticas.ibge.gov.br/lista_tema.aspx?op=0&no=16

While electricity supply infrastructure has fewer gaps, power cuts resulting from the impact of the 2013-2014 drought on the country's hydropower resources highlight the vulnerability of the sector (WRI, 2014[30]). This is of particular concern as extreme dry periods and prolonged droughts are likely to increase as a result of climate change (Brazilian Panel on Climate Change, 2013[31]). With decreasing technology costs and a surge in the potential for economic applications, the investment case for low-carbon power generation technologies other than hydropower is increasingly compelling. In fact, the International Finance Corporation (IFC) estimates that "climate-smart" sectors such as green buildings, sustainable transport, renewable energy, energy efficiency, etc. represent an investment potential of USD 1.3 trillion for 2016-2030 (IFC, 2016[32]). As Brazil is emerging from the recession of 2015 and investment is growing (International Monetary Fund, 2018[33]), there is a distinct window of opportunity to modernise infrastructure and improve its management, while providing the foundations for sustainable development and long-term productivity growth.

Creating a strong policy framework for climate-compatible infrastructure

At the time of writing,[3] Brazil had made ambitious commitments to advance environmental sustainability and address climate risks (Table 3.1). Its Nationally Determined Contribution (NDC), the National Adaptation Plan, the National REDD+ Strategy, and the recent Ten-Year National Energy Expansion Plan collectively signal the government's intention to promote sustainable infrastructure for low-emission, climate-resilient development. In its NDC, Brazil has pledged to reduce its greenhouse gas emissions by 37% in 2025 (relative to 2005) and has provided an indicative reduction target of 45% by 2030 (from the same baseline year) (Federative Republic of Brazil, 2015[34]). Brazil is the only emerging economy to include an absolute emissions reduction target. Other plans also reflect similar ambitions. The Ten-Year National Energy Expansion Plan, for example, includes a goal of achieving a 48% share of renewable energy by 2026 (Ministério de Minas e Energia, 2017[35]).

A conducive policy and regulatory framework is important for promoting climate-compatible infrastructure investment, but it needs to be coherent in terms of both climate and capital market considerations, and to include the private sector. Brazil's policy and regulatory environment has made great strides in enhancing sustainable banking and investment since the first resolution on environmental, social and governance issues in the financial industry. Two resolutions by the Central Bank of Brazil stand out. Resolution 4,327

of 2014 established principles that must be taken into account when financial institutions develop their social and environmental responsibility policies. This was followed by Resolution 4,557 in 2017, which requires financial institutions to continuously and systemically integrate environmental and social considerations into risk assessment processes (Sustainable Banking Network, 2018[36]).

Table 3.1. Summary of national policies and programmes relating to the promotion of climate-compatible infrastructure

In reverse chronological order

Policy/fund/programme	Main features
10 Year National Energy Expansion Plan (2017-2026)	BRL 1.4 trillion (USD 438 billion) investment plan. Objective: 48% of renewables in 2026. Installed power capacity forecasts: 64.1 GW, 50% from non-conventional renewable sources, 22% from hydroelectric dam projects. Solar is expected to grow the fastest, increasing to 9.7 GW. Wind is expected to reach 28.5 GW from 10 GW, biomass 17 GW from 13.8 GW, small hydro 8.2 GW from 5.8 GW.
Nationally Determined Contribution (2016)	37% GHG emission reduction in 2025 (relative to 2005), indicative reduction target: 45% by 2030. Brazil is the only emerging economy with an absolute emission reduction target. Sub-targets to 2030 include e.g. 45% of renewable energy (incl. large hydro) in the energy mix; 10% electricity efficiency gains; zero illegal deforestation and compensation for GHG emissions from legal suppression of vegetation. No quantitative adaptation target.
National Plan on Climate Change Adaptation (2016)	Priority areas include agriculture; cities; industry and mining; natural disasters; infrastructure (energy, transport and urban mobility); water resources, coastal resilience. Overarching goals for e.g. climate data; co-ordination between public and non-public actors.
National Strategy on REDD+ (ENREDD+, 2016)	Improve monitoring and impact assessment of REDD+ policies; promote consistency and synergies among climate change, forest and biodiversity policies at all government levels; mobilise resources to meet emission reduction commitments in the Brazilian biomes by 2020.
National Plan on Energy Efficiency (2010)	106 TWh/year energy saving target to 2030, through measures in public buildings and lighting, industry, construction and waste water systems, etc.
National Policy on Climate Change (2009) and National Plan on Climate Change (2008)	The National Policy is the umbrella framework for climate change. It includes sector plans and provides an institutional framework for interministerial and broader exchange. The primary aim of the National Plan relates to the co-ordination of mitigation and adaptation measures. It includes targets to increase recycling in urban areas, and promote solar-based heat applications, biogenic fuels and combined heat and power systems. Public policies and strategies in all sectors should integrate the aims and guidelines of the National Policy.
Investment Partnership Programme (PPI, 2016)	Objective: strengthen public-private co-operation for e.g. infrastructure projects. The related PPI Law aims to facilitate the development of infrastructure projects by creating a centralised monitoring and co-ordination mechanism. Pipeline: 145 projects, incl. 69 transportation projects and 60 energy projects. BNDES supports the PPI through projects' bankability assessments, offering financing lines, and managing the Supporting Fund to Partnerships Structuring.
Growth Acceleration Programme (PAC 1 2007 and PAC 2 2010)	Programme to promote large-scale infrastructure projects to be implemented by the federal government, state enterprises and the private sector. PAC 1 (2007-2010) foresaw investment of BRL 504 billion (USD 255 billion) in e.g. electricity generation (13.1%) and transport (11.5%), PAC 2 included a budget of BRL 1.59 trillion (USD 904 billion) and focused on e.g. transportation, energy and housing.
PPP Law (2004)	Provides general rules for competitive bidding and contracting of private sector entities and establishes an organisational structure in the federal government to oversee the Brazilian PPP programme. PPP modalities generally envisage a capital injection by the public sector to support the private sector's investment activities.

Note: GHG: greenhouse gas; GW: gigawatt; PPI: Investment Partnership Programme; PPP: public-private partnership; REDD+: Reducing emissions from deforestation and forest degradation; TWh: terawatt hour.
Source: (Ministério de Minas e Energia, 2017[35]); (Federative Republic of Brazil, 2015[34]); (Ministry of Environment, 2016[37]); (Government of Brazil, 2009[38]) (Ministério do Planejamento, n.d.[39]); (Government of Brazil, 2016[40])

Doing more to mobilise commercial capital

It is estimated that Brazil will require an annual investment rate of 4.2% of GDP to increase the current infrastructure stock of 36% of GDP to a target infrastructure stock of 60% (Frischtak and Mourão, 2017[41]). Transportation and sanitation have the largest deficit, needing a 130% increase in the rate of investment in order to modernise infrastructure. Given the fiscal limitations following the recent recession and an estimated infrastructure investment gap of USD 1.3 trillion for 2016-2030 (IFC, 2016[32]), there is increasing awareness of the limitations of a public sector-led infrastructure investment model. Since 1991, investment

in infrastructure as a percentage of GDP has oscillated around 2% – not even enough to cover depreciation (Raiser et al., 2017[26]) (Wagner, Bertol and Murphy, 2014[42]). A recent World Bank report highlights that many Latin American countries, including Brazil, can promote climate-compatible infrastructure by using concessional public resources more strategically and prioritising the mobilisation of commercial financing where appropriate (Fay et al., 2015[18]).

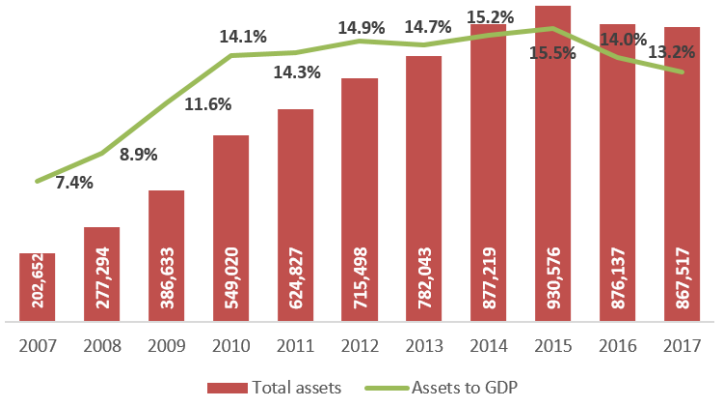
In addition, a well-functioning capital market is crucial for efficient capital intermediation between users and providers of capital, and could become an important complement to banks in financing infrastructure. The mobilisation of institutional investors, however, depends on several factors, including robust public-private-partnership (PPP) and project finance frameworks; and the existence of deep domestic capital markets (Garcia-Kilroy Heinz Rudolph, 2017[43]); (Raiser et al., 2017[26]); (Yokota et al., 2017[8]). While Brazil's capital market is well-developed, it lacks depth – notably in the flexibility and diversity of capital market financing solutions to better match infrastructure project needs. For example, commercial bank financing is limited to 10 years, and most transactions in Brazil's capital market are in the three to five-year maturity range (Yokota et al., 2017[8]). In contrast, the average infrastructure asset life in Brazil is 25 years (Yokota et al., 2017[8]).

3.2. An overview of BNDES

BNDES is Brazil's largest national development bank and is one of the largest NDBs in the world. In 2016, overall loans disbursed by BNDES totalled USD 23.2 billion – 5.7 billion less than those of the World Bank. However, in 2011 – at the height of treasury transfers to BNDES (see below) – BNDES' loan disbursements were about four times larger than those of the World Bank (USD 83 billion vs. USD 22 billion) (Butzbach and von Mettenheim, 2016[44]). BNDES' assets were estimated at just over 13% of Brazil's GDP in 2017 (Figure 3.2), and the bank has played an undeniably important role in financing infrastructure in the country, responsible for an estimated 70%-80% of total infrastructure financing in Brazil over the last 10 years (Yokota et al., 2017[8]).

Figure 3.2. BNDES' assets account for a large share of Brazil's GDP

Total assets in million BRL and as a % of GDP



Note: Assets in local currency units, GDP in current local currency units.

Source (BNDES, 2018[45]):, Historical data, https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Investor_Relations/Financial_Information/historical_data.html; (The World Bank, 2018[46]), GDP (current LCU), https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=BR.

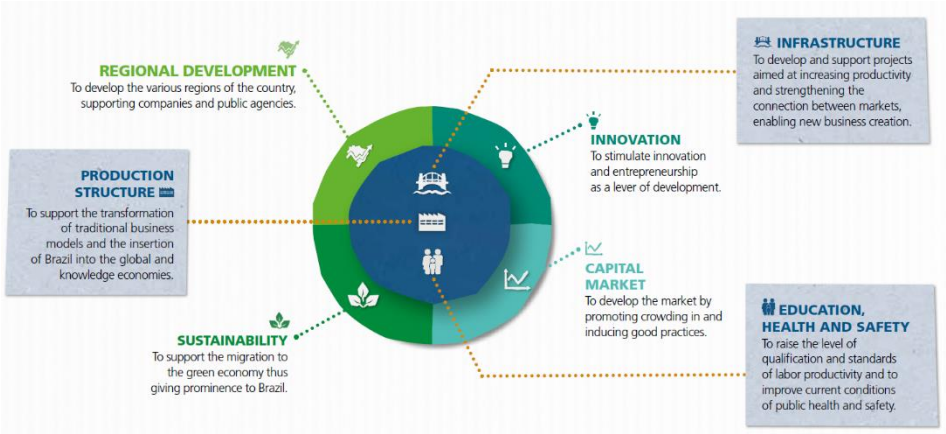
Mandate and mission

Established in 1952 as a key policy implementation instrument for the Brazilian Government, BNDES' specific focus has changed over time[4] (OECD, 2015[47]). Since its creation, and in response to government priorities, BNDES has at times provided long-term credit for promoting large energy and transportation projects, focused on support to domestic private companies, and supported export promotion (Musacchio, 2009[48]); (Najberg, 1989[49]); (Velasco, 2010[50]). When commercial banks reduced lending in the aftermath of the financial crisis in 2008, BNDES funnelled subsidised credit from the Brazilian Treasury to counter the sharp reduction in domestic credit supply and meet Brazil's long-term investment needs (Stiglitz and Lin, 2013[51]); (Barbosa, 2010[52]). As a result, BNDES' assets increased by 236% from 2008 to 2015 (BNDES, 2018[45]). Its total credit assets represented 21% of total credit to the private sector in 2013 (Lazzarini et al., 2015[53]), and it contributed almost the totality of long-term credit in the same year (Figure 3.2).

In 2018, BNDES underwent a strategic planning exercise to reflect on and update its institutional identity, strategic guidelines and mission. This resulted in an enhanced, clear focus on environmentally sustainable development, as well as on capital market development, in the bank's purpose and identity. The new BNDES mission is "to facilitate financial solutions that contribute with investments for the sustainable development of the Brazilian nation" (BNDES, 2018[54]). This is underpinned by strategic guidelines (see Section 3.3) for its three pillars – infrastructure; production structure (i.e. businesses); and education, health and safety – and four cross-cutting areas, including sustainability through a green economy and capital market development (i.e. crowding in market actors) (Figure 3.3).

Figure 3.3. BNDES' strategic guidelines underpin its three pillars

Updated in March 2018



Source: (BNDES, 2018[54]), *Annual Integrated Report 2017*, https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Investor_Relations/Annual_Report/annual-report2017.html.

Governance structure and resources

BNDES is a public financial institution under the supervision of the Ministry of the Economy.[5] The BNDES System includes three entities: BNDES itself, and its two subsidiaries BNDES Participações S.A. (BNDESPar, the bank's equity investment arm with operations in the capital market) and FINAME, which promotes the production and marketing of machinery and equipment. In terms of governance, the Advisory Board is BNDES' highest body and has 11 members, 3 of which are appointed by the Ministry of Planning, Development and Management (BNDES, 2018[54]). BNDES' Board of Directors has deliberative power and is appointed by members of the Advisory Board.

BNDES' resources come largely from government sources and its own returns, though it also receives funds from other sources (Table 3.2). Until 2015, the major source of BNDES' funds included loans from the National Treasury and constitutionally mandated transfers from the Workers' Assistance Fund (FAT).[6] As of mid-2016, 80% of BNDES' funding was sourced from the Treasury and FAT. BNDES' funding structure is complemented by other government funds, funds from multilateral and bilateral institutions, bond issuance, funds from public issuances of BNDESPar debentures and returns on its own operations.

Table 3.2. BNDES' funding structure

As of June 30, 2018

Source	Description	Share of funding
National Treasury	Loans from the National Treasury	44.1
Workers' Assistance Fund (FAT)	BNDES receives 40% of all FAT/PIS-PASEP revenues as per the Constitution	31.3
PIS/PASEP	Funds from the PIS/PASEP assigned to BNDES in addition to the 40% to be provided as per the Constitution	2.4
Net worth	Profits from past lending	8.6
International borrowings	Loans from international financial institutions	2.7
International bond issuance	Bonds issued in the international market	2.4
Domestic bond issuance (e.g. BNDESPar)	Bonds issued in the domestic market	0.2

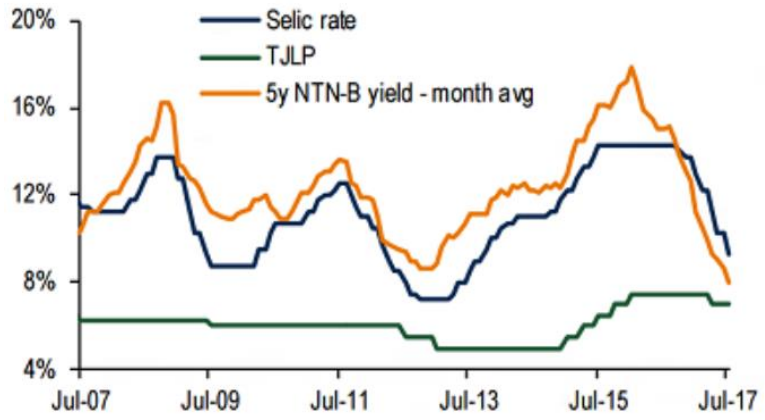
Amazon Fund	Resources from foreign governments and Petrobras to combat deforestation in the Amazon biome, and promote the conservation and sustainable use of natural resources in the Amazon biome.	0.7
Others		7.6

Notes: FAT = Fundo de Amparo ao Trabalhador (Workers' Assistance Fund); PIS = Programa de Integração Social (Social Integration Programme); PASEP = Programa de Formação do Patrimônio do Servidor Público (Public Servant Asset Formation Programme)
Source: BNDES financial statements

One major change facing BNDES' funding model is the introduction of a new benchmark interest rate for the bank (*Taxa de Longo Prazo*, or TLP) in January 2018. Previously, BNDES charged the interest rate TJLP (*Taxa de Juros de Longo Prazo*) which was set at a significant discount to the market rate[7] (Figure 3.4). In effect, this represented a subsidy to those companies and projects granted TJLP loans, and increased public spending as well as public debt (Byskov and Clavijo, 2017[55]).

Figure 3.4. Differences in the TJLP and the Selic rate and domestic public bond yield, 2007-17

% per annum



Note: Selic rate: overnight interest rate of the Brazilian Central Bank; TJLP: *Taxa de Juros de Longo Prazo*, interest rate charged by BNDES in effect until December 2017; NTN-B: *Notas do Tesosuro Nacional-Série B*, inflation-linked securities that pay semi-annual coupons (monthly average depicted above).
Source: (EUROMONEY, 2017[56]), *Brazil set to pass critical credit reform*, https://www.euromoney.com/article/b14jmdbrg7n5z1/brazil-set-to-pass-critical-credit-reform

The new TLP rate will be linked to the yield on inflation-indexed government debt (NTN-B bond yield, see Figure 3.4), and thus significantly decrease the spread between the interest rate charged by BNDES and the market rate. The TLP will continue to increase until 2023 when it – and thereby BNDES' borrowing cost – will be equivalent to a five-year inflation-linked Brazilian treasury bond.[8] Some view the introduction of the TLP as one driver of BNDES's changing role from being the major investor in infrastructure projects to mitigating risks for private and commercial investors within project structures (Yokota et al., 2017[8]).

3.3. BNDES' financing for environment and climate change

BNDES' policies and strategies guide its environmental support

BNDES' new mission and strategic guidelines are underpinned by its Social and Environmental Responsibility Policy (PRSA) and its Corporate Social Responsibility (CSR) Action Plan. These have increased the momentum with which it is implementing its ambition to promote green growth and sustainable infrastructure. The CSR Action Plan 2015-2017 included, amongst others, the development

and approval of a Social and Environmental Policy for Capital Market Operations (BNDES, 2017[57]). The PRSA is a prominent instrument to help BNDES integrate social and environmental dimensions into its overall strategies, policies, practices and procedures. BNDES also has an environmental and social safeguards framework in place, and is piloting an approach to integrate environmental risks into its financial risk management system. It is also working to strengthen its safeguards framework, partnering with the International Finance Corporation (IFC) in 2017 to assess gaps in its safeguards framework for loans, using the IFC Performance Standards as a benchmark (IFC, 2017[58]).

While BNDES does not have a specific climate change policy or strategy, climate change considerations are increasingly included in the bank's work. For instance, BNDES ceased financing conventional thermal power plants in October 2016 to underscore its willingness to drive Brazil's climate efforts (Faria and Angelo, 2016[10]). Under the CSR Action Plan 2018-2020, BNDES aims to formalise its public commitment and targets to deliver Brazil's NDC; develop financial mechanisms to mobilise resources for "green projects"; align social and environmental risk management with international standards; and prepare for the integration of climate change considerations into operational analysis, portfolio risk management and information disclosure (BNDES, 2018[59]). Targets typically have important signaling and multiplier effects. Internally, they help to re-align staff incentives to work towards achieving institutional targets. Externally, bank targets – such as for sustainable infrastructure promotion – provide clear expectations about future priorities and guide project developers on upcoming business opportunities.

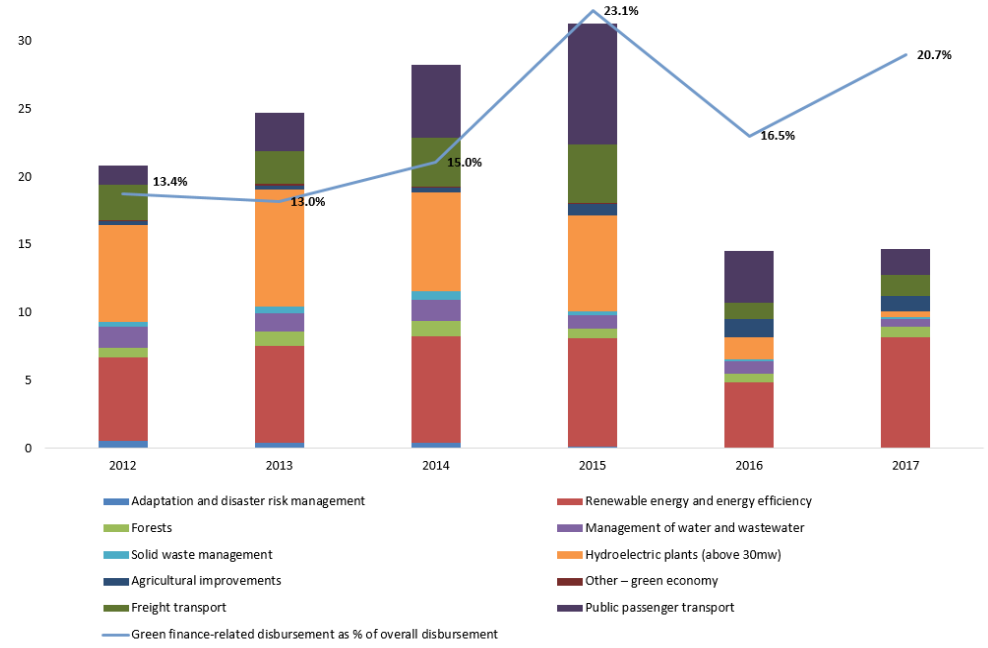
BNDES' green financing trends are positive

The economic slowdown of the last few years and the changes in BNDES funding model have seen the bank's overall disbursements contract year-on-year since 2014. Yet the share of BNDES's green economy-related disbursements increased between 2012 and 2017: from 13.4% to 20.7% of its total disbursements (Figure 3.5) (BNDES, 2018[45]). In 2017, BNDES disbursed BRL 14.7 billion (USD 4.2 billion) on green economy-related projects (Figure 3.5 and Figure 3.6). The vast majority of green-economy-related disbursements targeted infrastructure projects (BRL 13.5 billion or USD 3.7 billion) (Figure 3.5 and Figure 3.6). Within green infrastructure projects, renewable energy and energy efficiency accounted for the largest share (33% on average between 2012 and 2017) followed by large hydropower (22%) and public transport (12%) (Figure 3.5). Disbursements related to climate change adaptation and disaster risk reduction averaged 1.2% in the period from 2012 to 2017. In the period from 2012 to 2017, 57.3% of Brazilian municipalities were supported with green economy-related disbursements (BNDES, 2018[54]).

A snapshot of BNDES's green commitments in 2017 reveals further insights (Figure 3.6). Green economy-related disbursements represented 20.7% of all disbursements in 2017, and the majority (59%) were for clean energy. While large-scale hydropower appears prominently in a five-year average (Figure 3.5), BNDES significantly reduced these disbursements in 2017 (to BRL 0.4 billion). After clean energy, transport was the second-most prominent sector, representing 23% of all green disbursements in 2017.

Figure 3.5. Despite volumes falling overall, BNDES' share of green disbursements is increasing

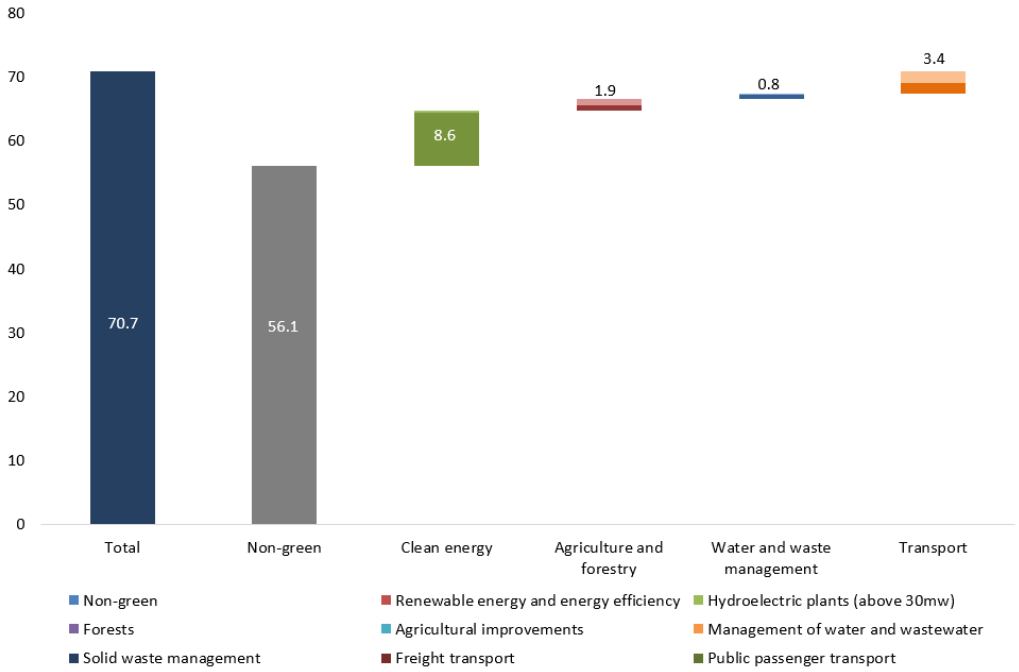
BRL billions, 2012-2017



Source: (BNDES, 2018[45])

Figure 3.6. Clean energy received the lion's share of BNDES finance

BRL billions, in 2017



Source: (BNDES, 2018[45])

Additionally, BNDES' framework to avoid, mitigate and manage potential environmental and social risks across its portfolio can be categorised as increasingly strong at the time of writing. Its Social and Environmental Responsibility Policy 2015-2017 included integrating these risk considerations into BNDES' risk management policies and launching a benchmarking exercise with other development banks on their social and environmental policies. It is currently piloting the integration of environmental and climate-related risks into its financial risk management.

BNDES' financing conditions encourage climate-related projects

BNDES has a range of tools at its disposal to support sustainable infrastructure and climate change-related projects, including loans and equity, private equity and venture capital funds (see Box 3.1 for one example). An analysis of the bank's operational policies indicates the incentive structure for infrastructure projects within BNDES' basic financing conditions (Table 3.3). These are subject to frequent changes, including in response to BNDES' policy mandate and market development. In the third quarter of 2018, sewage and waste treatment projects received the most preferential financing. Solar, waste-to-energy and energy efficiency projects were subject to slightly less preferential conditions given the shorter tenor (20-14 years) and lower maximum participation by BNDES in the value of eligible items (80%). While water treatment projects have higher financing costs, BNDES offers to finance up to 95% of the capital costs with a tenor of up to 34 years. The Brazilian onshore wind market is increasingly consolidated, largely spurred by a policy focus on wind energy since 2002[9] and BNDES' complementary efforts in developing the Brazilian wind energy market.[10] Accordingly wind power projects are less subject to preferential financing than for example solar power projects.

Table 3.3. BNDES' financing conditions vary by project

Types of infrastructure investment	Financing condition
Sewage and waste treatment	(1+TLP)*((1+0.9%)+(1+project specific risk spread))-1 95% maximum capital cost coverage by BNDES Up to 34 years tenor
Solar, waste to energy Energy efficiency (industrial processes, buildings, public lighting, generation improvement, smart grids)	(1+TLP)*((1+0.9%)+(1+project specific risk spread))-1 80% maximum capital cost coverage by BNDES 20-24 years tenor
Water treatment	(1+TLP)*((1+1.3%)+(1+project specific risk spread))-1 95% maximum capital cost coverage by BNDES Up to 34 years tenor
Urban mobility	(1+TLP)*((1+1.3%)+(1+project specific risk spread))-1 80% maximum capital cost coverage by BNDES Up to 34 years tenor
Wind, biomass, hydropower and natural gas Transmission and distribution	(1+TLP)*((1+1.3%)+(1+project specific risk spread))-1 80% maximum capital cost coverage by BNDES 20-24 years tenor
Conventional thermal power plants (coal and oil)	No financing since October 2016

Increasingly preferential financing

Note: TLP is BNDES' benchmark interest rate. In January 2018, the TLP was launched with a rate equivalent to its predecessor TJLP, and is being introduced over a five-year transition period. The Central Bank of Brazil sets the TLP on a monthly basis, taking into account inflation and a fixed rate based on the yields on five-year inflation-linked governments bonds (NTN-B). Preferential financing conditions depend on BNDES' strategic priorities, in line with Brazilian Government guidelines provided by the federal government. See also Section 3.2.
Source: (BNDES, n.d.[60]); (BNDES, n.d.[61]); (BNDES, n.d.[62]); (BNDES, n.d.[63]); (BNDES, n.d.[64]); (BNDES, 2016[65]); (BNDES, n.d.[66])

The need to mobilise commercial capital for climate-compatible infrastructure frames the changes to BNDES' mandate, the reform of its capital structure, the introduction of the TLP and the differentiated financing conditions described above. Higher rates on BNDES loans are likely to provide a stimulus for a deeper and more competitive project finance market, and mobilise commercial capital for climate-compatible infrastructure as a complement to BNDES financing. BNDES' pipeline in debentures for

renewable energy projects is an increasingly attractive vehicle to attract commercial investors. However, issues persist around the liquidity of infrastructure debentures and the size of the investor pool given the availability of other tax-free securities. While BNDES is actively seeking to change its role in the market – moving from "infrastructure financer" towards "mobiliser of commercial capital", changes will need to be implemented gradually given the lack of deep capital markets to date.

Box 3.1. Project case: Public-private partnership to support Metrô Bahia

Climate-compatible public transport in urban areas – e.g. suburban railroads and subways – is a growing priority in Brazil. Urbanisation and the rise of the Brazilian middle class have resulted in increased demand for mobility, leading in turn to a spike in the vehicle fleet, GHG emissions from transport, air pollution and other environmental pressures.

The metropolitan area of Salvador, in the north-eastern state of Bahia, has 3.5 million residents. In line with the state government's priority, BNDES supported a public-private partnership (PPP) for the operation, maintenance and expansion of a mass transport system, Metrô Bahia. The project involves a build, own, transfer model with a 30-year concession from the state. As well as building two metro lines with 32 kms of extension and 19 metro stations, the project provided for the construction of a cycle lane and eight bus-metro integration terminals. Total investment in December 2018 amounted to BRL 6.3 billion (USD 1.7 billion), with BNDES providing BRL 3.054 billion (USD 836 million) and KfW Development Bank co-financing BRL 546 million (USD 147 million). As in most other infrastructure projects, the project's structure was already fixed when BNDES became involved making it difficult for it to influence its design, location and socio-environmental risk management. Other co-financers include the federal government and the state government (granting power). The state government's support to the municipalities of Salvador and Lauro de Freitas was key in getting the project off the ground.

The project became operational in April 2018 and has a daily passenger use of 350 000. Over the concession period, the project is expected to avoid 212 000 tons of CO_2 emissions.

Source: Internal BNDES project documents

BNDES is an important implementer of national environment and climate change priorities

As the government's main instrument for long-term finance, BNDES is often implicitly the main implementer of environment and climate change policies. For example, BNDES provides loans within the implementing framework for the National Fund on Climate Change, established as part of the National Policy on Climate Change. The climate fund primarily aims to promote urban mobility, sustainable cities, efficient machinery and equipment, renewable energy and sustainable forest management. The Ministry of Environment exercises steering control and administers grants, while BNDES provides loans. In addition, BNDES manages the Amazon Fund, which is Brazil's main national and regional REDD+ financing mechanism. Brazil reduced the deforestation rate in Amazonia Legal by 75% from 2004 to 2014 (Instituto Nacional de Pesquisas Espaciais, 2018[67]), and has received donations for the Amazon Fund in the order of USD 1.2 billion from Norway, Germany and Petrobras. Another illustration of BNDES role in Brazil's current landscape of financing for the environment and climate is demonstrated by its support for the wind industry. From 2003 to 2017, BNDES approved a total volume of BRL 36.2 billion (USD 9.9 billion) for 101 wind power projects with an overall capacity of over 12 000 MW (see Box 3.2 for one example). This corresponds to 72% of Brazil's wind capacity forecast for 2021 (ANEEL, 2017[68]).

Box 3.2. Project case: Supporting wind farms in Maranhão

BNDES used long-term financing to support the development of eight wind farms with 96 wind turbines in the northeastern state of Maranhão. The project implementation challenge involved the management of environmental risks due to the proximity of the wind farm to freshwater turtle nestling grounds. Drawing from its experience in wind project development and in environmental licensing processes, BNDES linked its operational flow to licensing milestones and achievements, and added an additional requirement to the environmental impact assessment.

The project was financed through a BNDES loan (65% at TJLP), sponsor equity and a green bond contribution (10%). Capacity was sold at two auctions in 2015. The Inter-American Development Bank partially refinanced the project to the tune of USD 750 million in the scope of the Loan Agreement for Sustainable Energy signed with BNDES in 2017.

The overall development impact includes the provision of electricity to 700 000 households, environmental protection and a contribution to global climate action. The project constitutes the first wind farm in the area. Given local poverty levels and lack of income opportunities, BNDES also incorporated social measures into the overall project design. Other than this project, BNDES' efforts to develop Brazil's wind power market have contributed to technology maturity and significantly lower specific investment costs.

Source: Internal BNDES project documents

3.4. BNDES' role in mobilising commercial capital

Low-cost, long-term finance for infrastructure is critical for Brazil to achieve its climate and development objectives. There is a major shortfall of private infrastructure financing in Brazil, and as a result BNDES has provided the vast majority of debt for infrastructure projects since its foundation (see Table 3.4). However, in order to promote financial market development and support capital markets, BNDES will need to transition from a financing to a mobilising role. The bank is already working on this, as illustrated by its efforts to build capital markets and it's Sustainable Energy Fund (see below). These efforts are expected to increase in line with BNDES's new mission (BNDES, 2018[54]).

Table 3.4. BNDES's annual disbursements by recipient and instrument

2012-2017 (BRL million)

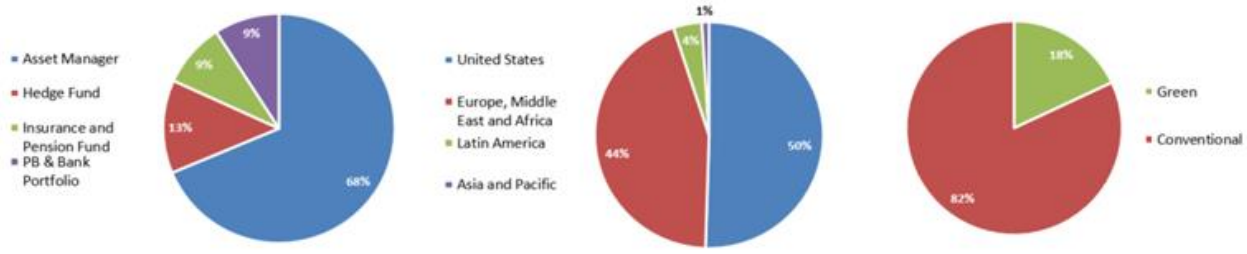
	2012	2013	2014	2015	2016	2017	01-06 2018
Annual disbursement for infrastructure							
Public	3 805	8 753	8 232	9 767	4 385	2 002	826
Private	49 093	53 422	60 719	45 130	21 521	24 832	10 200
Grants	5	6	38	4	2	3	53
Loans	52 512	61 958	68 034	54 650	25 661	26 838	10 973
Equity	381	211	880	243	243	14	
Annual disbursement to green economy-related sectors							
Public	937	1 590	2 961	3 552	2 320	867	432
Private	8 336	7 932	7 889	11 124	4 710	5 597	3 369
Grants	24	27	113	69	85	97	146
Loans	9 110	9 457	10 641	14 594	6 926	6 366	3 652
Equity	138	38	95	13	18	2	4

Source: (BNDES, 2018[45]), Historical data, https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Investor_Relations/Financial_Information/historical_data.html

Two recent developments stand out in BNDES' efforts to develop Brazil's capital for investment in climate-compatible infrastructure. In May 2017, BNDES issued a USD 1 billion green bond (BNDES, 2017[69]). Listed on the Luxembourg Green Exchange, it was the first international green bond issuance by a Brazilian bank. High demand for the bond helped to reduce its price from an initial assessment of 5.25% to 4.8%. As shown in Figure 3.7, 18% of the deal was allocated to investors with a specific focus on green finance. The bond issuance will support eight wind power generation projects in Brazil, with an overall installed capacity of 1 323 MW. In addition to being a benchmark for BNDES, as the first international green bond issuance by a Brazilian bank, this could pave the way for other Brazilian issuers' access to the green bond market (BNDES, 2018[70]).

Figure 3.7. Green bond issuance of BNDES

Allocation by type, region, and profile of investor



Source: (BNDES, 2018[70]), Green Bond Presentation, https://www.greenfinancelac.org/wp-content/uploads/2018/05/3.-BNDES.pdf

In 2017 and 2018, BNDES structured and implemented the Sustainable Energy Fund (*Fundo de Energia Sustentável*). With BRL 500 million in equity (USD 144 million) and a term of 15 years, the fund builds on an established securitisation framework (Fundo de Investimentos em Diretos Creditóris, or FIDC) and aims to invest in low-carbon infrastructure debentures. In 2011, a Federal Law created infrastructure debentures to stimulate commercial finance for priority infrastructure projects such as electricity and transportation (CFA Society Brazil, 2016[71]). The main incentive for investment in infrastructure debentures is the income tax exemption for local retail and foreign investors. The law applies the tax exemption additionally to investments in other funds after two years if the funds invest at least 85% of their equity in infrastructure debentures.

Within BNDES' Sustainable Energy Fund, investors engage in a pool of infrastructure projects without having to incur the costs of analysing and monitoring individual projects. In addition to promoting a new financing vehicle for infrastructure projects, BNDES' broader aim is to encourage the creation of a market for green securities in Brazil and increase the investor base for infrastructure projects. The fund is a partner of the Climate Bonds Initiative, and had secured 11 institutional investors, local pension funds and insurance companies at the time of writing, allowing BNDES to limit its capital allocation to the fund to 43%.

BNDES' introduction and further development of this financing vehicle underlines the bank's willingness and ability to encourage the mobilisation of commercial capital for climate-compatible infrastructure. Alongside the income tax exemption, other investment incentives under the fund include (1) inflation-indexed long-term investment; (2) attractive credit spreads compared to e.g. government bonds; (3) a forward-looking, comprehensive infrastructure project pipeline in line with Brazil's infrastructure investment needs; as well as (4) an attractive credit profile (minimum rating of A).

3.5. Emerging insights for future directions

Maintaining BNDES' leadership on green finance

BNDES already plays a key role in supporting Brazil's commitments on environment and climate change, especially those involving infrastructure. Despite a decrease in overall disbursements in the last few years, BNDES has maintained and even increased its share of green economy-related financing. This trend, coupled with the banks' action to scale down support for fossil fuels, demonstrates BNDES' commitment to the environment and climate change. This commitment is also translating into other actions, such as BNDES' efforts to pilot the integration of environmental risk into financial risk screening, identify and fill gaps in its safeguards framework, and focusing on the green economy in its new strategic vision.

Brazil's ambitious NDC will require BNDES to continue to scale up its green economy-related work. Several development banks – including the major MDBs as well as members of the International Development Finance Club (IDFC), such as the French development agency (AFD) and Japan International Cooperation Agency (JICA) – have made climate finance commitments supported by action plans and strategies for implementing them. In addition, some banks – such as AFD – have committed to aligning their portfolios with the goals of the Paris Agreement, thereby ensuring that all their activities either actively support climate goals, or at the very least do not undermine the achievement of these goals.

Going forward, a public commitment to and target for meeting Brazil's commitments under the Paris Agreement may help BNDES maintain its momentum on green finance, as well as garner support from the government and international actors. This is already recognised in the bank's CSR Action Plan 2018-2020. As a public financial institution, a public commitment and corresponding target would have to be supported by the government. It will also require strengthening staff capacity and ensuring adequate resources to continue mainstreaming environment and climate change into the bank's work. Currently, BNDES has approximately 30 people working specifically on environmental issues (out of the 2 300 people working for BNDES overall).

Transitioning from financer to mobiliser of finance

Going forward, leadership on green finance will be associated less with financing infrastructure projects, and more with seeking to leverage commercial finance, mobilising commercial capital, bringing nascent climate solutions to market and addressing market failures.

Changes in BNDES' pricing and funding structure, including the introduction of a new benchmark interest rate (TLP), will have implications for BNDES' ability to continue acting as a "market maker" for low-carbon technologies. At the same time, the changing rate is driven by government efforts to diversify sources of funding for infrastructure, including from commercial sources and capital markets. BNDES's core strengths, i.e. as a long-term source of finance, coupled with its risk management and safeguards, will continue to support its efforts to scale up renewable energy and energy efficiency. BNDES will also need to continue to develop financial instruments fit for Brazil's development aspirations, the Paris Agreement, changes in its pricing and funding structure and an altered macroeconomic environment.

The 2017 issuance of a green bond and introduction of the Sustainable Energy Fund are promising initiatives given the size of Brazil's power market and its green bond potential.[11] It will be important to monitor these financial innovations and learn from their implementation in continuing to introduce targeted financing instruments and mechanisms. These will likely centre on increasingly positioning BNDES as an enabler that:

- carries risks not readily assumed by the private sector
- improves the risk-return profile of infrastructure investment to mobilise commercial capital

- catalyses markets by demonstrating project viability and plugging techno-commercial gaps to attract further commercial capital.

A clear focus in BNDES' corporate reports and score cards on mobilising commercial finance and leveraging other sources of capital – alongside the current focus on disbursements – could support greater efforts in this area.

Stepping up efforts to screen environmental and climate risk

Alongside strengthening its role as enabler of finance, BNDES will need to continue to act as a direct financier, e.g. building project pipelines and developing projects. Screening and monitoring climate risks associated with infrastructure investment is one key area where Brazil will need to quickly scale up efforts. Several MDBs have started rolling out climate risk-screening measures to support the climate-proofing of projects. In increasing its efforts in this area, BNDES will need to work more closely with subnational governments earlier on in the project cycle. For example, for some infrastructure investments, request for BNDES' financing and the subsequent project review take place once the project design and several conditions are already set, which gives BNDES only limited scope to influence the project. Recent work with the Ministry of Environment to pilot climate risk assessment may provide an opportunity to highlight barriers and solutions in this area.

Strengthening BNDES' role in the institutional framework for climate action

A key element in enabling BNDES to drive Brazil's sustainable development and deliver its NDC is to formalise its positioning in Brazil's institutional framework for climate action. Institutionalising BNDES as implementer in a financing and catalysing role would allow the bank to focus its efforts on NDC implementation and help align its portfolio with the goals of the Paris Agreement. BNDES, as the government's tool for long-term finance and infrastructure development, has a comparative advantage over other institutions in fulfilling this role.

BNDES works closely with policy makers in the areas of infrastructure, climate and finance, and with the private sector (in the form of financial institutions) and project developers. It could thus transmit clear policy signals to the private sector on the one hand, and on the ground insights from infrastructure development and capital mobilisation back to policy makers on the other. This could include information on the current state of NDC implementation, the policy and changes needed to achieve set targets, and the formulation of future NDCs. Accreditation to the Green Climate Fund will significantly expand BNDES' status in the international climate finance architecture, and underscore the need to establish BNDES as a key driver of Brazil's NDC.

Enabling BNDES – the role of government and the international community

As a national financing entity, BNDES' activities are strongly influenced by government policy and direction, as well as by direct financial support, as demonstrated by the major change to the bank's portfolio following support from the Treasury. With the introduction of the TLP, BNDES will have to increasingly act as both financer of projects as well as mobiliser of other sources of capital. However, the bank's ability to support newer technologies – where current markets are not yet mature – will continue to depend on its ability to provide concessional finance. For example, access to concessional finance – either from the government or through international development partners – will remain key for solar power, which is not yet as cost competitive as in other countries (Andreão, Michelle and Miquel, 2017[12]), as well as energy efficiency.

However, concessional finance will increasingly need to be used strategically to increase total financing for climate-compatible infrastructure. It should therefore be used only in cases where commercial finance is currently not available for projects with positive climate outcomes. It should also have an explicit focus on opportunities to mobilise commercial capital for climate-compatible infrastructure projects (OECD,

2018[72]). A programmatic approach of supporting nascent technologies for climate-compatible infrastructure and bringing them to maturity for commercial financing could frame the increased mobilisation of commercial capital. While BNDES can ensure this programmatic approach within its own operations, a broader strategic approach to align Brazil's national financial systems with the objectives of the Paris Agreement demands decisive climate action by other relevant actors as well.

To continue to drive Brazil's sustainable development pathway effectively, BNDES needs to align its portfolio with the goals of the Paris Agreement and have adequate human, financial and institutional capacities in place. To ensure an enabling environment, the new government (which is to assume office in January 2019) must continue to pursue increasingly ambitious climate action. This will mean ensuring that BNDES has sufficient staff with an environmental and/or climate background, as well as appointing multipliers in non-focal sector divisions; developing and deploying a broad set of financial instruments and approaches to encourage different forms of private sector engagement in promoting climate-compatible infrastructure; and ensuring BNDES is well integrated in the NDC formulation and stock-taking processes. A clear and coherent mandate from the government to continue efforts to support a green economy, and to increase the focus on climate action, could support the bank's efforts in this area, despite the changing pricing and macro-economic context.

4. Climate-compatible infrastructure: the role of DBSA

Infrastructure is critical to underpin economic growth and development; however, current investment levels in South Africa are insufficient. Meeting the infrastructure challenge and the goals of the Paris Agreement simultaneously will require scaling up investment in climate-compatible infrastructure and embedding climate considerations into all infrastructure investments. In addition to contributing to the fight against climate change, this radical shift in South Africa's infrastructure base could have a net positive impact on domestic economic growth and lead to a more competitive, resilient and inclusive society. However, the window to act is closing before the planet reaches a critical tipping point in global warming – transformative and decisive action is needed now.

National development banks (NDBs) have played an important role in the country, serving as a crucial source of finance for the economic and natural infrastructure sectors on behalf of the government. Within this context, the Development Bank of Southern Africa (DBSA) is an important means of implementing South Africa's development priorities. More recently, it has played an essential role in supporting South Africa's transition to a green economy through its management of the Department of Environmental Affairs' Green Fund. It is also the sole entity in South Africa accredited by the Green Climate Fund (GCF) and is the only national development bank that is an implementing agency for the Global Environment Facility (GEF). Changes in South Africa's economic and policy environment, coupled with the need to achieve the objectives of South Africa's Nationally Determined Contribution (NDC), raise questions about the role of DBSA and how it needs to evolve.

This chapter presents an overview of DBSA and describes its role in supporting climate-compatible infrastructure in South Africa. It begins by outlining the overarching policy and finance landscape for infrastructure in the country. The subsequent sections explore DBSA's financing and approaches for climate-compatible infrastructure and catalysing commercial capital, illustrated by three case studies. The final section draws insights and lessons on the role of DBSA in supporting climate-compatible infrastructure, which may be useful for other national development banks.

4.1. Challenges and opportunities in financing climate-compatible infrastructure

Using infrastructure development to drive growth and economic transformation

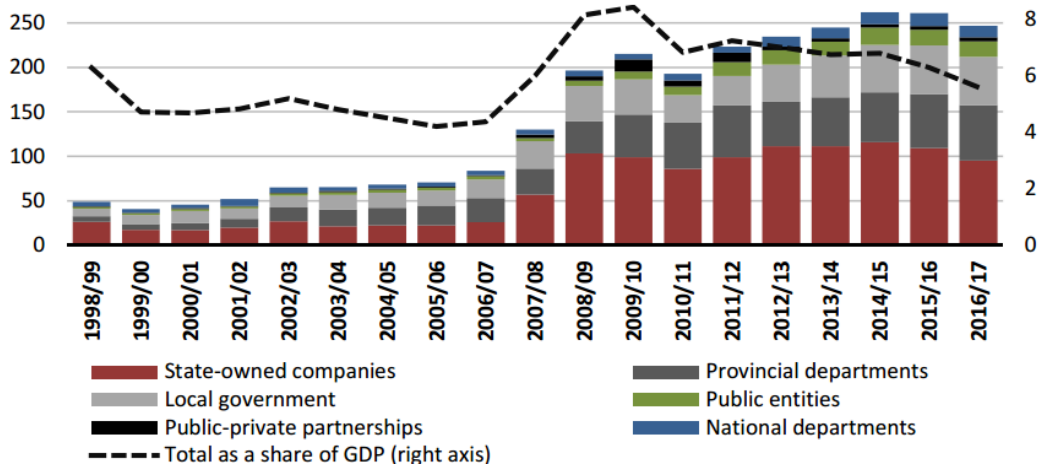
Since the end of the apartheid era and transition to democratic rule in the mid-1990s, South Africa has made significant economic progress and taken decisive strides to improve the welfare of its citizens, supported by a strong focus on infrastructure development. Access to electricity and water is widespread, and enrolment in primary school is universal for both girls and boys (OECD, 2017[73]). The South African Government has long embraced the correlation between growth, development and infrastructure, viewing the latter as the chief driver of South Africa's "growth, inclusivity and job creation" (Presidential Infrastructure Coordinating Commission, 2012[74]). As a result, infrastructure lies at the heart of South Africa's development strategy: it is pivotal to the New Growth Path and the National Development Plan.

The latter notes that "to achieve sustainable and inclusive growth by 2030, South Africa needs to invest in a strong network of economic infrastructure" (National Planning Commission, 2012[75]). Since the enactment of the nation's Infrastructure Development Act in 2014, a dedicated body – the Presidential Infrastructure Coordinating Committee – facilitates and co-ordinates public infrastructure development across all ministries. Its goals are to ensure buy-in of the government's infrastructure ambitions across ministries, build capacity for infrastructure management among all public actors involved in the infrastructure value chain, address potential trade-offs over infrastructure projects, and accelerate infrastructure implementation.[12]

South Africa's infrastructure investments have increased markedly since the 2000s (Figure 4.1). In 2011, before crafting the new National Infrastructure Plan (IOL Business Report, 2011[76]), South Africa's infrastructure backlog was estimated at ZAR 1.5 trillion. The plan, adopted in 2012, had a target for short-term infrastructure investment spending of ZAR 827 billion over 2014-17. This target played a key role in driving public infrastructure investment levels over that period, although the government fell short of the target by roughly ZAR 50 billion. In total, from 1999 to 2017, the government spent more than ZAR 2.7 trillion on infrastructure. It also steadily increased its annual spending levels, going from just under ZAR 50 billion a year in the early 2000s to over ZAR 250 billion a year. State-owned entities – such as the Development Bank of Southern Africa – have remained the preferred delivery channel over the years.

Figure 4.1. The government's spending on infrastructure has risen steadily, 1989-2016

ZAR billion (left axis, columns); % GDP (right axis, line)



Source: (National Treasury, 2018[77]), *Public-sector infrastructure update*, www.treasury.gov.za/documents/national%20budget/2018/review/Annexure%20D.pdf.

Despite increases in spending, structural gaps persist. South Africa faces an investment shortfall of ZAR 6 trillion (USD 464 billion) if it is to meet the Sustainable Development Goals by 2040, including a gap of ZAR 297 billion (USD 23 billion) in the water and electricity sectors (Oxford Economics and Global Infrastructure Hub, 2017[78]). Infrastructure investment in South Africa amounted to 4.7% of GDP from 2010 to 2015. While this is above average for developing countries, it is lower than other BRICS such as China and India, which spent 8.3% and 5.6% over that period respectively (Woetzel et al., 2017[79]).

Infrastructure quality is also an issue. The 2018 Global Competitiveness Report by the World Economic Forum ranks South Africa 72nd out of 137 economies for infrastructure quality (World Economic Forum, 2017[80]). While South Africa's infrastructure stock is the most advanced of the Sub-Saharan region, its quality varies greatly between and within urban and rural areas, with electricity shortages and intermittency and access to public transport remaining challenges in certain places. Furthermore, water supply and

sanitation are very constrained by the high pressures on limited water resources. A recent drought around the city of Cape Town resulted in a severe water shortage and brought attention to the issue of climate change and the inherent challenges faced by municipal utilities in the region.

However, these gaps can be seen as a window of opportunity for South Africa to choose a different economic pathway – one anchored in climate-compatible development. As the country will need to fast-track its efforts to close the infrastructure gap in order to meet the Sustainable Development Goals, it can choose to do so by investing in decarbonised and climate-resilient infrastructure rather than continuing and further building out fossil-fuel intensive infrastructure. Not only would this help meet the goals of the Paris Agreement and be the most cost-efficient option, it would also unlock further growth for South Africa in the long term (OECD, 2017[2]). The International Finance Corporation estimates the potential for climate-smart investments in South Africa at USD 588 billion over 2016-30 (IFC, 2016[32]). The long-lived nature of infrastructure assets means that the wrong decisions made today on infrastructure development have the potential to lock South Africa into high-emissions development that will exacerbate climate change for decades.

Using public funds more catalytically in South Africa's constrained fiscal space

While South Africa has enjoyed significant growth overall since the apartheid era, this has not been without fluctuations. In particular, the global financial crisis had a severe impact on South Africa's economy. It resulted in the country going into recession in 2009 for the first time since 1980 – with nearly one million jobs lost in that year alone. Recovery has been sluggish in recent years – e.g. tepid economic growth rates of 0.56% and 1.32% were recorded in 2016 and 2017 respectively. The economy contracted further in 2018, with South Africa entering a technical recession in September that year. This low-growth macroeconomic context is combined with high rates of inflation and unemployment and high interest payments that are increasing public debt. As a result, the fiscal space is severely constrained. This is limiting the government's capacity to meet the physical and social infrastructure investment needs necessary to unlock higher growth.

In contrast with other emerging economies, the outlook on capital markets is much more positive, however. South Africa's capital markets are open, deep and supported by sophisticated prudential regulations and financial supervisory bodies. Vulnerabilities exist – stemming from currency volatility and a high share of household credit in GDP – but are closely supervised. Importantly, South Africa has overcome its "original sin"[13] and is able to raise finance from international markets and foreign investors in local currency (Miyajima and Chan, 2012[81]); (Sabbadini, 2018[82]). The Johannesburg Stock Exchange All Share Index has a USD 1 trillion market capitalisation and South Africa accounts for around 70% of the total market capitalisation of listed companies in Sub-Saharan Africa.

In this context, for South Africa to achieve its infrastructure ambitions, the key will be to use public finance as a catalyst for private sector investments, and to create a conducive enabling environment. In addition to well-functioning capital markets and a solid macroeconomic outlook, this includes robust yet flexible frameworks for public-private partnerships (which currently tend to be cumbersome and lack flexibility). Further regulatory policies will be required to ensure that this infrastructure is sustainable, as detailed below.

Breaking the fossil-fuel dependency

South Africa, home to one of the richest biodiversity endowments and several endemic ecosystems and habitats, is also one of the most resource and carbon-intensive countries in the world, ranking 11th for GHG emissions in absolute terms (and 36th when considering emissions per capita) (OECD, 2013[83]). This is due to the country's historically heavy reliance on coal for electricity generation – the coal share in the South African energy mix amounts to over 90%. Moreover, South Africa is also vulnerable to the effects of

climate change, especially sea-level rise and an increase in frequency and severity of droughts. As a result, South Africa fully recognises the urgent need for climate action. It has taken considerable strides to build a strong policy framework to advance environmental sustainability and the green economy (TIPS et al, 2018[84]), with climate policies being significantly strengthened and scaled up in recent years. South Africa's constitution incorporates sustainable development as a human right (Liebenberg, 2000[85]). Meanwhile, the National Development Plan – which works as a blueprint and overarching framework for development decisions – and the National Climate Change Response Policy White Paper, detail South Africa's climate change response in the context of national development needs and present a vision for a transition to a low-emission, climate-resilient pathway (Republic of South Africa, 2011[86]); (Republic of South Africa, 2012[87]) (National Business Initiative, 2017[88]).

South Africa's commitment to address climate change involves mitigation goals and targets to achieve a peak in greenhouse gas emissions by 2025, which will then plateau for approximately a decade, before declining (Climate Action Tracker, 2013[89]). This target and vision are aligned with the National Strategy for Sustainable Development and Action Plan, and South Africa's NDC. The latter further delineates South Africa's adaptation response, which includes the intention of developing a national adaptation plan and significantly increasing in investments to assess vulnerability and develop an emergency response system (Pauw et al., 2016[90]).

Collectively, these policies constitute an enabling regulatory environment that is sending clear signals that the government intends to pursue a low-emission, climate-resilient pathway. These policies are also further complemented and translated into government initiatives which have a signalling and demonstrating effect that is critical to the private sector. These initiatives include the Department of Environmental Affairs (DEA) and DBSA-managed Green Fund, the Renewable Independent Power Producer Programme and initiatives under the Near-Term Priority Climate Change Programmes. Between 2011 and 2015, DEA estimates that the government spent ZAR 141 billion on environmental-related programmes. However, a step increase in investment is required to achieve South Africa's vision as laid out in its NDC. To illustrate the scale of resources needed, South Africa's Intended Nationally Determined Contribution (INDC) estimates that ZAR 3490 billion would be needed between 2015-2050 to decarbonise the electricity sector alone (Republic of South Africa, 2015[91]). To meet these investment needs, the public sector will need to mobilise and catalyse private sector investment, hence the importance of a conducive enabling environment and strong climate action by the government.

Further work must be done to better embed climate considerations in each of the infrastructure sectoral plans. There are encouraging signs, however; the draft 2018 Integrated Resource Plan (IRP), recognises the increasing cost competiveness of renewables and notes in its modelling, "the scenario without renewable energy annual build limits provides the least cost option by 2030" (Republic of South Africa Department of Energy, 2018[92]). If implemented, the IRP would result in a power mix in which coal no longer holds a majority share by 2030.

It is worth noting that climate action in South Africa is largely seen through the prism of equity and inclusive poverty eradication (Radebe, 2018[93]); (Climate Transparency, 2018[94]). Debates on the transition often centre on the issues of fairness for workers in the coal sectors, or on whether distributional impacts on marginalised populations are sufficiently taken into account when formulating national responses to climate change. South Africa's INDC thus notes that "the transition to low carbon and carbon resilient society must take into account and emphasize its overriding priority to address poverty and inequality" (Republic of South Africa, 2015[91]). A successful transition to a low-carbon climate-resilient economy in South Africa is a transition that first and foremost leaves no one behind in terms of poverty eradication. There is increasing awareness among South Africans of environmental considerations as well as the lack of trade-off between growth and climate change in the long term; and that the "dirtier" economical model of the past did not deliver its promise in terms of employment.

There is also increasing awareness within the South Africa financial market of the need to align all financial flows with a climate-consistent pathway. In 2017, South Africa's National Treasury convened a Working Group of financial regulatory agencies and industry associations – such as the South African Reserve Bank, Financial Services Board and Banking Association – to develop a framework for sustainable finance. While significant progress has been made since 2011, with the amendment of Regulation 28 and launch of the Code for Responsible Investing in South Africa, further guidance is required on how to implement this in practice.

Taken together, these challenges and opportunities – the available infrastructure investment opportunity, a strong climate policy framework, limitations of the fiscal space, the deep capital market, and efforts to integrate environmental risks into financial institutions' operations – have implications for the mobilisation of commercial capital for climate-compatible infrastructure in South Africa.

4.2. An overview of DBSA

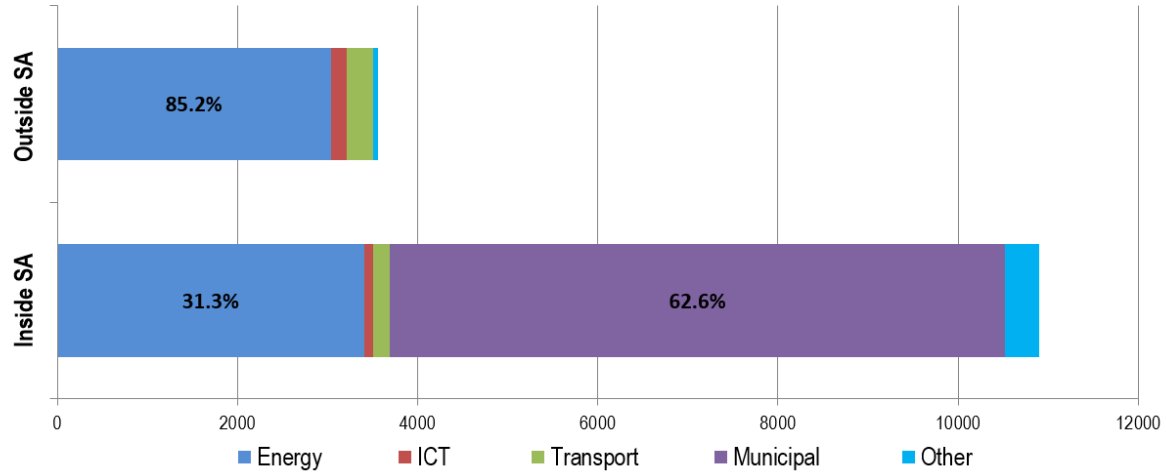
Formally established in 1983 during the apartheid era, DBSA is a development finance institution whose sole shareholder is the National Treasury. When created, DBSA took over all the loans, staff, assets and liabilities of several existing organisations that were funding economic development projects in the apartheid state, mostly in rural areas and the "homelands". With the advent of democratic rule and the enactment of the Constitution in 1996, DBSA, in its modern form, was reconstituted by a 1997 Act of Parliament – the Development Bank of Southern Africa Act [No. 13 of 1997] (DBSA Act). The DBSA Act states the main objectives of the DBSA and primarily governs its constitution and conduct. DBSA is one of three national development banks in South Africa – the other two being the Industrial Development Corporation (IDC) and Land and Agricultural Bank (LANDBANK), which focus on industrial development and agriculture, respectively.

Mandate and mission

DBSA's mandate, as stipulated by the DBSA Act, is "the promotion of economic development and growth, human resources development, institutional capacity building, and the support of development projects and programmes in the region". Despite this language, it has been interpreted over the years as a sole focus on infrastructure integration and development, primarily in South Africa, but also in other African countries, especially those of SADC (Southern Africa Development Community). More specifically, DBSA sees its mission as "to advance the development impact of the region by expanding access to development finance and effectively integrating and implementing sustainable development solutions to: i) improve the quality of life of people through the development of social infrastructure; ii) support economic growth through investment in economic infrastructure; iii) support regional integration; and iv) promote sustainable use of scarce resources" (DBSA, 2018[95]). DBSA's vision is "a prosperous and integrated resource-efficient region, progressively free of poverty and dependency" (DBSA, 2018[96]). Beyond servicing big infrastructure projects throughout South Africa and the SADC region, DBSA has a specific mandate to work with underserved municipalities on infrastructure issues relating to planning and service delivery (Figure 4.2).

Figure 4.2. Local government receives the lion's share of DBSA's disbursements

2016-17 average, ZAR million and shares of largest sectors



Source: based on data provided by DBSA.

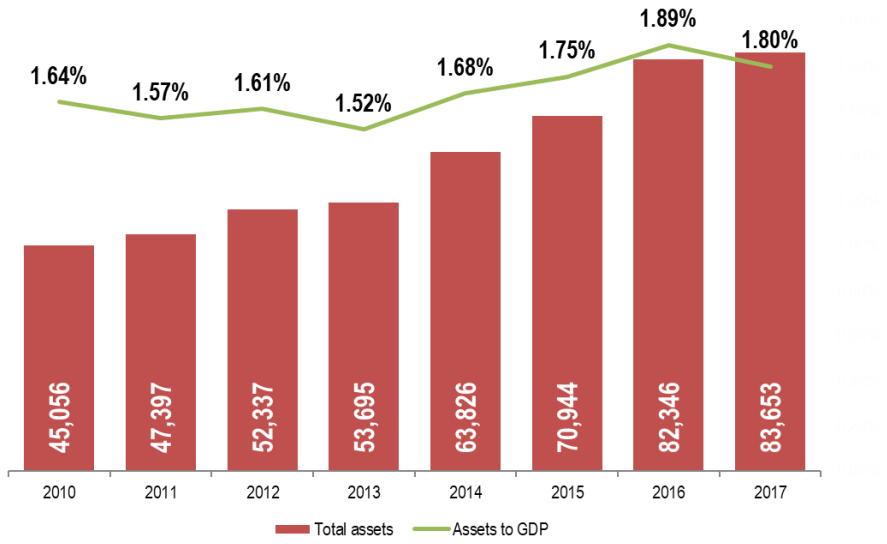
Funding structure

While DBSA received its original capital from the South African Government in 1994 – in the form of shares in permanent, interest-free government funding – it was created as a self-financing entity, meant to raise funds from capital markets supplemented by occasional public credit lines. The bank does not take deposits and is not intended to receive regular budgetary allocations from the South African Government, save from emergency measures or to support growth. The latter was the case in recent years and resulted in DBSA sometimes receiving targeted support. The government's capital provided to DBSA is considered callable and is not meant to be used or depleted over time.

DBSA's balance sheet is relatively small given the size of the South African economy. DBSA's portfolio in 2017 constituted less than 2% of the South African total banking system's assets. DBSA's assets-to-GDP ratio is regularly under 2% (Figure 4.3), while it can reach well over 15% for other national development banks, e.g. in Brazil. However, it is important to note that DBSA is a purely infrastructure-focused bank, while BNDES has broadened out into sectors and activities beyond infrastructure since its creation.

Figure 4.3. DBSA's total assets

Total assets in million ZAR (columns) and as a share of GDP (line)



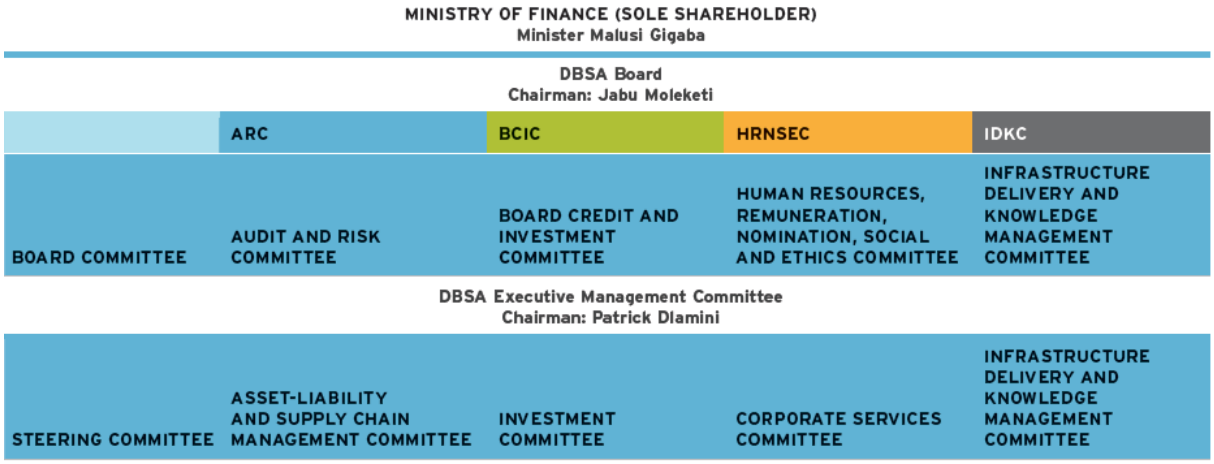
Source: based on data provided by DBSA.

Financial sustainability is one of the three pillars of DBSA's strategy, which includes a key performance indicator (KPI) of 4.7% on return on equity. This, in addition to a maximum gearing ratio of 2.5, has often been cited as a constraint on DBSA taking part in more risky investments which would fall under the remit of its development bank mandate. Furthermore, DBSA does not benefit from an explicit sovereign guarantee that would allow it preferred access to softer financing terms. However, for the purpose of raising ZAR-denominated finance, credit-rating agencies rate it as if it had an implicit government guarantee and peg its credit rating with that of the sovereign. This makes DBSA most competitive in the provision of long-term financing, while commercial banks are more attractive for short-tenor financing of under seven to eight years.

Governance and organisational structure

While DBSA is wholly owned by the South African Government, it is governed by an independent board of directors, accountable to the Ministry of Finance for making sure DBSA delivers its mandate (Figure 4.4). There are 14 members on the board, the majority (11) of which are independent non-executives. Only one board member is from the Ministry of Finance, and this member serves in a non-executive capacity. Day-to-day operations are managed by the Executive Management committee, itself broken down into four committees, mirroring those of the board. The Minister of Finance approves, but does not appoint, board members.

Figure 4.4. DBSA's governance and organisational structure



Source: (DBSA, 2017[97]), *2017 Integrated Annual Report: Driving Investment in Infrastructure, Development Bank of Southern Africa*, https://www.dbsa.org/EN/About-Us/Publications/Annual%20Reports/DBSA%20Integrated%20Annual%20Report%202016-17.pdf.

4.3. DBSA's financing for environment and climate change

DBSA has ambitious environmental and climate change policies

A range of policies and strategies reflect DBSA's ambition to speed up environmentally sound and climate-smart investments. These policies also aim to mainstream environmental and social considerations into DBSA's decision-making processes and operations, and include its:

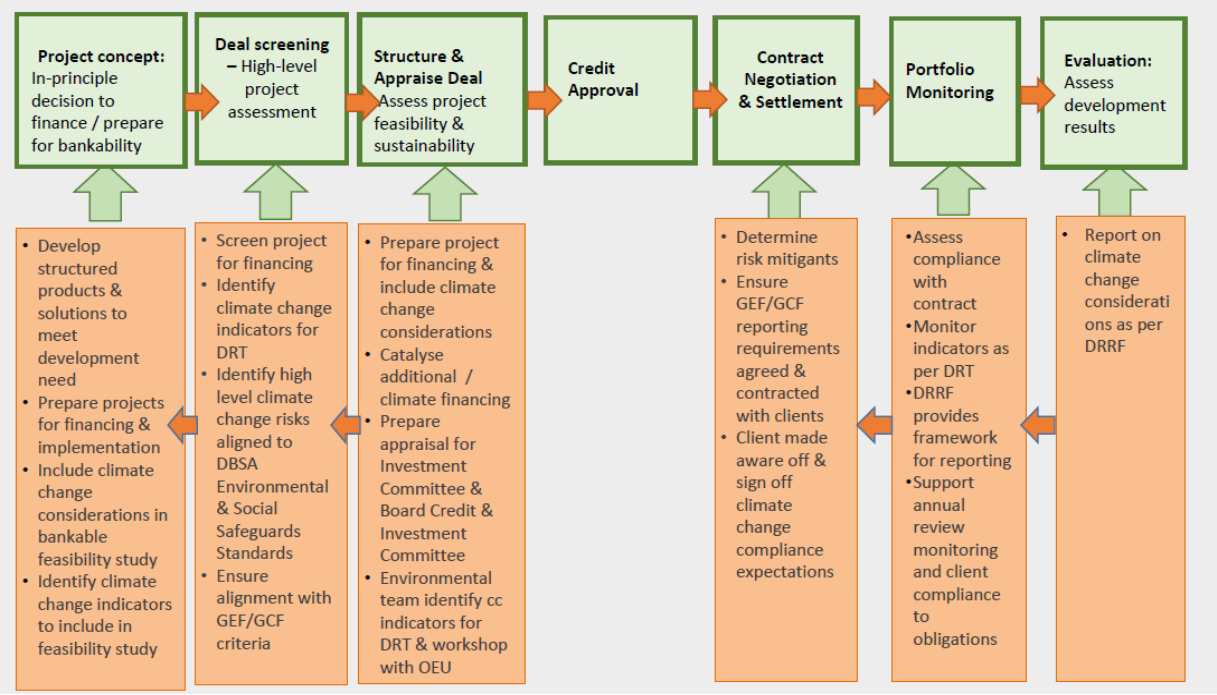
- Environmental and Social Safeguard Standards (ESS)
- Environmental Sustainability Strategy
- Climate Change Policy Framework (CCP)
- Environmental Appraisal Framework (EAF)
- Social and Institutional Guidelines.

DBSA's Environmental and Social Safeguard Standards guide it in managing social and environmental risk in its investment decisions. They are intended to guide clients in their due diligence preparation of infrastructure projects for financing so as to make sure investments minimise potential negative social and environmental outcomes. The standards are accredited with the Green Climate Change Fund and the Global Environment Facility. DBSA's Environmental Appraisal Framework aims to enhance the quality, transparency and coherence of environmental appraisals within DBSA. It translates DBSA's environmental policy into action and serves as a risk management tool, enabling environmental risk pricing and the identification of opportunities to improve the environmental profile of projects.

DBSA's recently adopted Climate Change Policy Framework is the chief instrument to guide DBSA's efforts to integrate climate change into its strategies, practices, policies and operations. It clarifies DBSA's role in contributing to South Africa's NDC and sets a climate change target whereby at least 35% of annual lending by 2022 must have a climate change objective (with sub-targets of 70% for mitigation and 30% for adaptation). The Climate Change Policy Framework also details how climate change is considered at all stages of the investment process. In particular, DBSA has developed a detailed reporting framework for all development aspects, including climate change. It encompasses 1) a Development Results Template (DRT) that includes climate change indicators and targets; 2) a Development Results Reporting Framework (DRRF) that consolidates indicators and monitoring and evaluation data for compiling DBSA's

annual report; and 3) a Sustainability Report given by DBSA to the board on a quarterly basis. These practices embed climate change considerations in all phases of the project lifecycle (Figure 4.5).

Figure 4.5. Climate change reporting at the different stages of DBSA's investment value chain



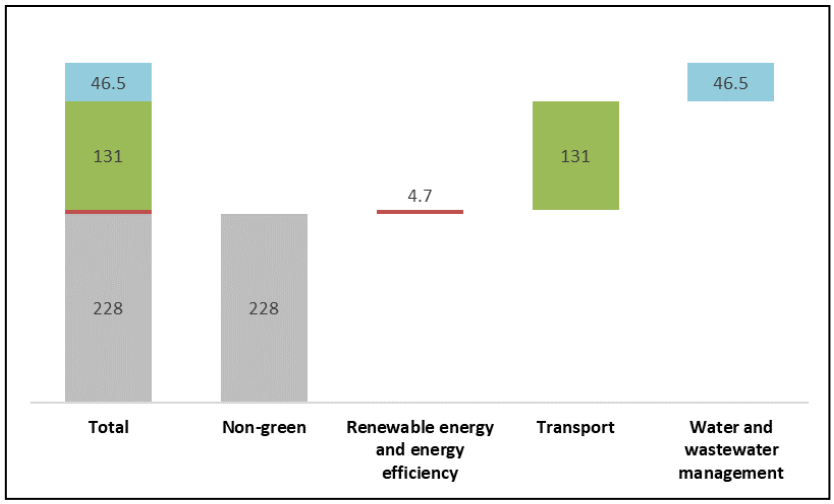
Note: DRRF: Development Results Reporting Framework; DRT: Development Results Template; GCF: Green Climate Fund; GEF: Global Environment Facility.

Furthermore, DBSA's sustainability framework or corporate scorecard outlines its strategy as it relates to both financial sustainability and sustainable development. For each of the pillars under the framework, DBSA must report key performance indicators. One key performance indicator is development impact, which is based on the DRRF. From now on, following the adoption of the Climate Change Policy Framework, there will be a more explicit environmental sub-indicator for climate change.

A snapshot of green economy-related commitments as reported to the IDFC for their Green Finance Mapping exercise reveals further insights (Figure 4.6). Commitments to the green economy represented 44.5% of all commitments in 2017, the majority of which (33%) were for the green economy and mitigation. Transport was the most prominent sector, representing 72% of all green economy commitments in 2017.

Figure 4.6. In 2017, transport received the largest share of DBSA's green economy commitments

USD millions



Source: based on data provided by DBSA

Climate mainstreaming is largely driven by engagement with green windows

DBSA's engagement on climate and environment has largely been driven by its involvement in special windows, the first of which was the Green Fund (Box 4.1). DBSA's management of the Green Fund has helped build internal capacities and laid the basis for its subsequent engagement with the GEF and GCF. Engagement with the GCF and GEF has also had a transformational impact on DBSA, leading to the overhaul of its Environmental and Social Safeguard Standards and reporting frameworks.

Box 4.1. Project case: South Africa's Green Fund

As part of the country's goal to transition to a greener economy, the South African Government established the Green Fund in 2012 through the Department of Environmental Affairs. The Green Fund is the first of its kind on the African continent. It is one of the key mechanisms for transitioning to a greener economy by investing in innovative projects that demonstrate a low-carbon, resource-efficient future. The fund's investment proposition focuses on additionality: it will only fund activities that would not go ahead without its involvement. Its model is similar to a green investment bank, but it is not qualified as such because it lacks an explicit focus on the private sector.

As of October 2018, ZAR 1.1 billion had been allocated to 55 projects under the Green Fund, representing ZAR 782 million in disbursements. The fund has at its disposal several instruments – grants, loans and equity – in order to achieve its objectives. Thematic areas of focus can be broken down into four windows: 1) green cities and towns; 2) low-carbon economy; 3) environmental and natural resource management; and 4) innovation for the green economy. The fund assists projects in these areas by providing either project development support, capacity building or research and policy development.

Role of DBSA and lessons learned

Day-to-day management of the fund is done by DBSA. Oversight and guidance are provided by a management committee which includes members from various government ministries

and entities, including DBSA and the National Treasury. The committee guides the fund and has final approval on projects. The Green Fund was DBSA's first foray into the climate space and has been the motor behind its more recent climate mainstreaming efforts. Through its management of the Green Fund, DBSA was able to be accredited by the Green Climate Fund and become an implementing agency for the Global Environmental Facility.

Source: (Department of Environmental Affairs, 2016[98]), "Green Fund Impact Study".

4.4. DBSA's role in mobilising commercial investment

For South Africa to deliver on its development and climate goals, scaling up investment in climate-compatible infrastructure will be critical. This will require substantial investment from the private sector. There is no shortfall of private finance in South Africa and private actors have long been involved in financing infrastructure, thanks to a robust public-private partnership (PPP) regulatory framework. However, due to market constraints, these private sector investments are rarely geared towards maximising development and climate impact. This is where DBSA has a key role to play, catalysing commercial finance to bridge the infrastructure gap in climate-compatible infrastructure and mainstreaming climate considerations into private-sector investment in infrastructure. As a result of its relatively small size and funding structure, DBSA has increasingly been looking to leverage its balance sheet and work through partnerships for greater financial and developmental catalytic impact, and has taken dramatic steps in the last couple of years to achieve this, as described below.

Catalysing green finance as a key performance indicator

In 2016, amid an uncertain economic environment and timid macroeconomic forecasts, and recognising the need for its funds to achieve more, DBSA took the decisive step to reduce its disbursement target. To offset that change, DBSA simultaneously introduced a mobilisation target in its strategic objectives, making DBSA one of the very few banks in the world to include catalysation explicitly in the corporate scorecard. This makes leveraging other sources of funding (e.g. from the private sector, other DFIs) part of DBSA's DNA. One of DBSA's KPIs in its 2018 annual report is to "be a catalyst for infrastructure by crowding-in third parties for between ZAR 28 billion and ZAR116 billion over the next three years" (DBSA, 2018[96]). This mobilisation KPI is now listed above the disbursement KPI in DBSA's corporate scorecard (Figure 4.7). In order to measure how much it crowds-in every year, DBSA has established a catalysation working group to develop an internal methodology on mobilisation. The current methodology is being audited independently by the office of the Auditor-General of South Africa.

Figure 4.7. DBSA's strategic objectives (as of 2018)



Source: (DBSA, 2017[97])

DBSA also has the strategic ambition to "unlock ZAR 100 billion in sustainable infrastructure development annually, which will contribute 2% to the GDP, whilst maintaining financial sustainability". It has set out its pathway and sources of competitive advantage to achieve that goal (Table 4.1). One project that epitomises DBSA's shift towards mobilisation is its Climate Finance Facility (Box 4.2).

Table 4.1. DBSA's priority actions and sources of competitive advantage for unlocking ZAR 100 billion annually for infrastructure

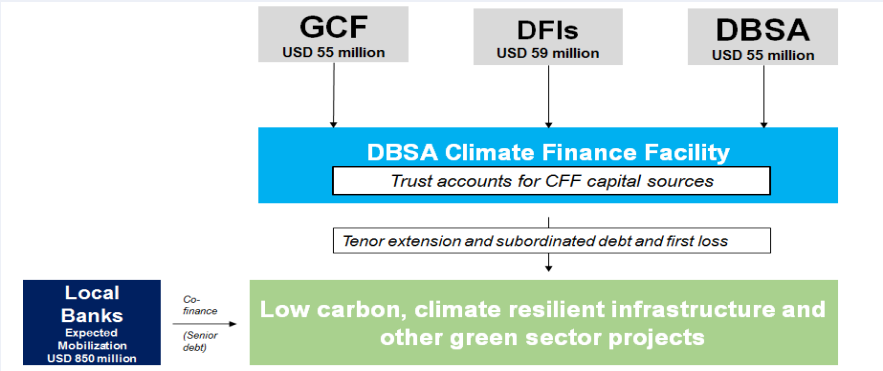
Priority action	Sources of competitive advantage
• Continue core long-term infrastructure lending activities • De-risk project finance structures to crowd-in third party funding • Greater investment in early-stage programme and project development • Develop structured products and funding structures to unlock infrastructure and crowd in third party funding • Establish project management offices and focus on maintaining of public infrastructure	• Strategic partnerships • Greater risk-return trade-off and longer tenors • Integrated infrastructure solutions, including early-stage risk and delivery capability • Access to concessionary financing

Source: (DBSA, 2017[97])

Box 4.2. Project case: DBSA's Climate Finance Facility

There are several market barriers to commercial capital's involvement in mitigation and adaptation projects which are limiting their replication and scale up. Recognising this, DBSA applied to the Green Climate Fund (GCF) for funding in March 2018 to set up the DBSA Climate Finance Facility (CFF). The CFF would be a blended finance structured debt facility targeting investments in climate-compatible infrastructure in the ZAR-denominated countries of SADC, especially those SADC countries connected to the Southern Africa Power Pool. The facility, the first of its kind on the African continent, aims to crowd-in commercial capital by improving the risk-return profile of commercially viable climate projects in local currency that are not able to self-fund in the market. The CFF will supply a range of credit enhancement mechanisms, such as subordination, first loss or tenor extension to the local commercial banks with whom it participates in co-financing arrangements. By doing so, the facility hopes to have a demonstration effect and support the capacity of commercial banks to invest in climate projects, thereby prompting the rapid ramp up of climate finance in the domestic markets of the SADC region. The facility is also intended to deliver significant proof of concept for other emerging economies in other regions.

Figure 4.8. The structure of DBSA's Climate Finance Facility



The CFF is modelled on a green investment bank, which is a publicly funded institution leveraging its balance sheet to catalyse significant levels of private climate investment. To achieve this goal, green investment banks design innovative market solutions to the market failures in the mitigation and adaptation

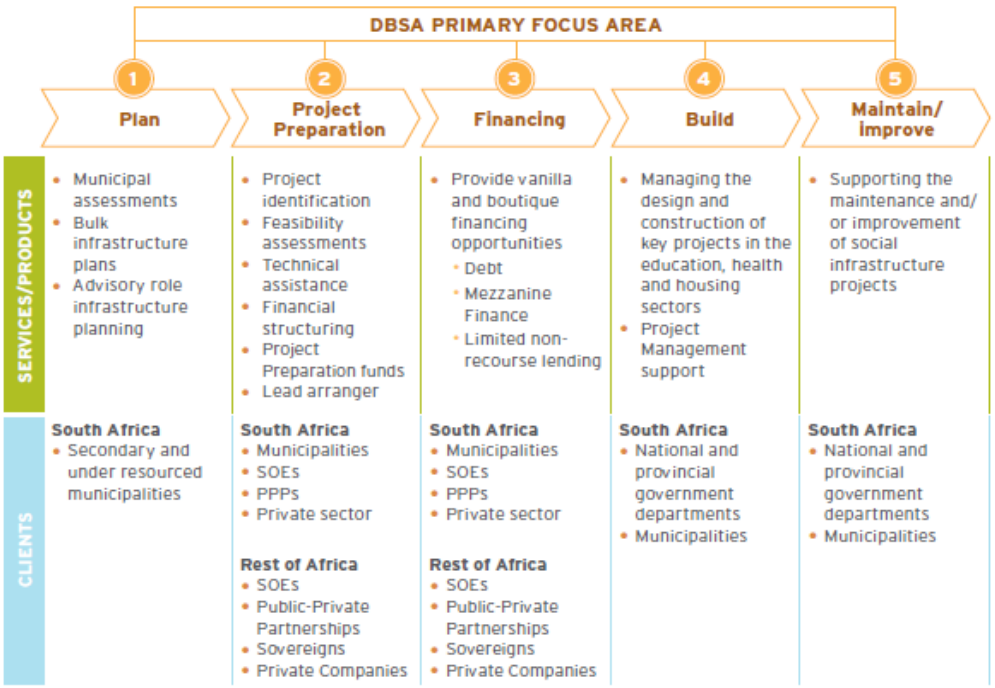
space. In the countries where GIBs have been created, they have been instrumental in building domestic capacity and driving higher levels of investment in climate finance. However, unlike other green investment banks, the CFF will not be a separate entity. Rather, it will be a special window within the DBSA, with its own separate balance sheet and dedicated operations. The Coalition for Green Capital (GCF), a non-profit organisation with expansive knowledge of green investment banks, is providing DBSA with early-stage development support and guidance through a grant it secured from Convergence and Climate Works. At its Board Meeting of October-November 2018, the Green Climate Fund agreed that this project could go ahead.

Source: (Green Climate Fund, 2018[99]), "Consideration of funding proposals-Addendum IX", https://www.greenclimate.fund/documents/20182/1674504/GCF_B.23_02_Add.09_-_Consideration_of_funding_proposals___Addendum_IX_Funding_proposal_package_for_FP115.pdf/f376409d-c0d4-d94d-405d-1578e2b35fe3

DBSA has shifted its focus from financier to the whole infrastructure value chain

While traditionally DBSA has primarily acted as a financier of infrastructure, its focus has recently shifted to the entire value chain of infrastructure services (Figure 4.9). This focus goes hand in hand with the shift towards catalysation described above. In particular, DBSA now sees its role as "financier, strategic partner, adviser, project preparer, implementer and catalyser" of infrastructure, taking "a holistic approach to infrastructure development by creating favourable investment conditions and terms for third-party investment, as well as financing and advisory solutions, along the entire infrastructure delivery value chain" (DBSA, 2017[97]). One example of this change is in the recent creation of a dedicated project preparation division and the commitment to increase project preparation activities to bring infrastructure projects amounting to ZAR 2010 to bankability by 2021. For example, DBSA has been assisting poorer municipalities to devise long-term infrastructure plans. DBSA also has a dedicated arm focusing on infrastructure delivery.

Figure 4.9. DBSA's role along the whole infrastructure value chain



Source: (DBSA, 2017[97])

Focusing on programmatic solutions for greater impact and scale

To reduce transaction costs associated with financing small-scale projects and to take a holistic approach to the barriers and bottlenecks constraining infrastructure investment, DBSA is increasingly looking into creating programmatic approaches. One example is South Africa's flagship Renewable Energy Independent Power Producer Procurement Programme (REIPPP), in which DBSA played a key role (Box 4.3).

Box 4.3. Project case: DBSA's role in South Africa's Renewable Energy Independent Power Producer Procurement Programme

First initiated in 2011, the Renewable Energy Independent Power Producer Procurement programme (REIPPP) is a state-run, nationwide competitive reverse auction mechanism for renewable energy projects. REIPPP has been very successful in mobilising private investment and driving the costs of renewables down in South Africa. This is mainly due to its unique design, which has two main elements:

- A competitive reverse auction system which grants contracts to project developers based on price and development impact, e.g. jobs created. In addition to falling technology costs, competition has been widely cited as the main driver of reduced bidding prices.
- 20-year inflation-indexed power purchase agreement (PPA) contracts between successful bidders and Eskom, the quasi monopolistic state-owned utility. Payments under the PPAs are covered by an explicit government guarantee from South Africa's National Treasury, thereby mitigating off-taker risk for potential private sector investors.

Another key aspect of the REIPPP is that it is embedded in the Integrated Resource Plan (IRP), South Africa's blueprint for the energy sector, which drives investments in particular energy subsectors in South

Africa. Based on the IRP, the Department of Energy (DoE) will periodically issue notices regarding the needs, by type of sources, for new power generation. The National Energy Regulator of South Africa will then license new capacity, but only within the range set by these notices. Recent IRPs have recognised REIPPP's contributions, while simultaneously setting limited targets for renewable energy generation, thereby potentially constraining their uptake. In the 2010 IRP, this target was 17.8GW by 2030. The newly released draft 2018 IRP slightly increases this target and for the first time recognises that annual build limits are restricting the country's total cumulative renewable installed capacity beyond 2030. It also acknowledges renewables as the least-cost option for South Africa's energy future.

By October 2018 there had been five REIPPP bidding rounds, attracting a wide variety of international and domestic project developers, utilities, sponsors, banks, insurers and DFIs. A sixth round, aiming to procure 1 800 MW, is scheduled in November 2018. It could potentially unlock up to ZAR 50 billion in investments.

DBSA's role

DBSA has played a dual role in this project. First, it had a pioneering role, alongside DoE and the National Treasury in setting up the independent power producer office, which subsequently implemented the REIPPP. Second it has participated as a financier in all of the REIPPP rounds to date, in the following capacities: 1) programme management advisory role for DoE; 2) joint mandated lead arranger and underwriter of projects in which it took part; and 3) leading financier of broad-based black economic empowerment (BBBEE) and local community trusts. While DBSA's involvement in 1) and 3) is well understood in its capacity as a development finance institution, some parties have questioned the continued need for DBSA's involvement in 2) in the later stages of the REIPPP, when proof of concept was established. In all, DBSA has taken part in 33 projects under the REIPPP, totalling ZAR 15 billion and 2542 MW (supplying 65 243 households). It is expected that these projects will result in the creation of 386 jobs. DBSA's participation in the REIPPP in terms of number of projects is further broken down in Table 4.2; 85% of DBSA's REIPPP portfolio is in photovoltaics (PV) and wind.

Table 4.2. DBSA's REIPPP programme portfolio overview

Numbers of projects

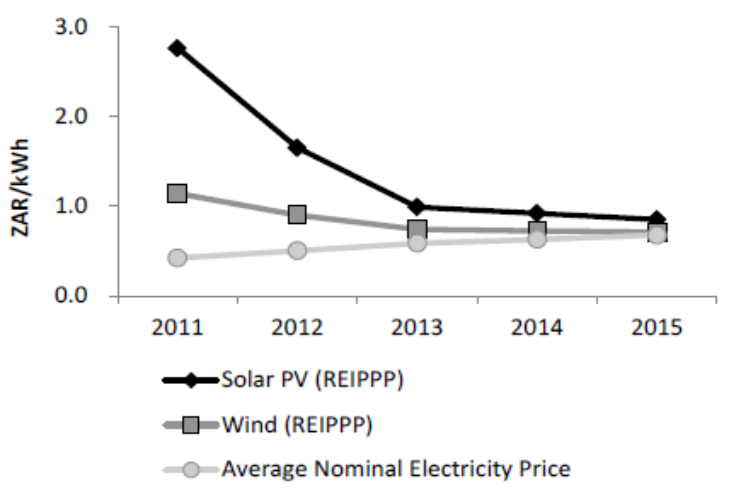
	Round 1	Round 2	Round 3 and 3.5	Round 4	Total number of projects
Wind	1	1	3	4	9
PV	8	1	-	9	18
CSP	2	-	3	-	5
Biomass	-	-	-	1	1
Total	11	2	6	14	33

Note: CSP: concentrated solar power

Results

As of October 2018, the REIPPP programme is responsible for 6.3 GW of renewable energy capacity (91 projects). The REIPPP process has also been key for driving down the prices of renewable energy in South Africa (Figure 4.10)

Figure 4.10. REIPPP auction prices for solar and wind have fallen, 2011-2015



Source: (McNicoll et al., 2017[25]), "Estimating publicly-mobilised private finance for climate action: a South African case study", OECD Environment Working Papers, No. 125, https://doi.org/10.1787/a606277c-en; (Chawla et al., 2018[100]), *Risks in Renewable Energy Markets in Emerging Economies,* https://www.ceew.in/publications/risks-renewable-energy-markets-emerging-economies

4.5. Emerging insights for future directions

Keeping DBSA's role central in South Africa's shift to climate-compatible infrastructure

Infrastructure is at the heart of South Africa's plans for achieving sustainable and inclusive development. In doing so, it recognizes the climate imperative; in recent years, the government has strengthened climate policies to address climate vulnerability, while also taking ambitious mitigation action.

As a public financial institution with a dedicated focus on infrastructure financing, DBSA has a key policy role. It has been a key institution for supporting and implementing climate action in South Africa. At 44.5% of all commitments in 2017, a substantial share of DBSA's activities already focus on the green economy, exceeding the target of 35% of annual lending set for 2022. At the same time, South Africa's national vision for sustainable development cannot be reached without a step increase in low-emissions, climate-resilient infrastructure investment.

At the domestic level, the systemic function of DBSA in supporting a transition to a green economy is reflected in its choice as manager of South Africa's Green Fund, and its pivotal role in programmatic and innovative approaches to mobilise private finance for the climate-compatible infrastructure that is central to the country's development ambition. Internationally, it is reflected by the fact that DBSA is the sole South African entity accredited to the GCF, while it was also the first national development bank to become an accredited implementing agency for GEF. Against this backdrop, DBSA's area of activity is bound to become more important. Through an institutional reform process driven by strong leadership and focused on enhancing impact as per its policy mandate, and strengthening its focus on mobilising and leveraging commercial finance for infrastructure, DBSA has taken essential steps to position itself for the future.

Driving the shift from financing to mobilisation

In 2016, DBSA took the step of moving from a sole focus on disbursement to introducing a target on mobilisation. Since then, mobilisation has become a key performance indicator at the institutional level,

with clear and direct implications for DBSA's way of doing business and how it is assessed as a public institution, e.g. through formal audits. These actions make DBSA a leading institution globally in the increasing focus on catalysation, and the changing role for public financial institutions with a policy mandate.

Having embarked on a journey towards a greater focus on development results and catalysation, it is now essential to carry this process further. Increasingly strong fiscal constraints, as well as DBSA's relatively small balance sheet (equivalent to about only 2% of the total South African banking system), leave it no alternative but to place a greater focus on programmatic approaches to catalyse broader finance. Notwithstanding its relatively small size, DBSA has taken strategic steps to build on its policy mandate and role, to leverage its balance sheet and work through partnerships for greater financial and developmental catalytic impact. Its experience of programmatic approaches, such as REIPPP, demonstrate its successful application of this approach.

While not completed, the change process provides some insights into potential change enablers and hinderers, which may prove useful for other national development banks thinking of following a similar path. Embedding transformative change towards sustainability and mobilisation requires carrying through the process of retooling the bank's reward and incentive structures, in corporate scorecards, targets and policies, which set the direction and framework on which the bank's operations are based. Ultimately, this implies changing DBSA's business model from a traditional national development bank offering direct financing, to a "development bank 2.0" model, which functions as a catalyst of private finance for climate-compatible infrastructure. Moreover, to ensure effective contributions to support South Africa's vision for sustainable development, it will be important to further advance the systematic integration of climate aspects throughout its policies and operations.

Ensuring DBSA's climate policy framework is fully embedded in its business model

As South Africa situates its strengthened policy framework for environmental sustainability in its development vision, there is an increasing appreciation of the opportunities such a pathway provides for achieving development goals. The government's integrated resources plan recognises that renewable energy provides the least-cost option for meeting South Africa's energy needs by 2030, while South Africa's sophisticated financial markets are also increasingly aware of the need to align all financial flows with a climate-consistent pathway.

Based on these clear signals from the government that South Africa is set on pursuing a low-emission, climate-resilient development pathway, DBSA has strengthened its focus on providing environmentally sound and climate-smart investments. It has introduced policies that aim to mainstream environmental and climate change considerations into its decision-making processes and operations. The adoption of the DBSA climate change policy framework and a climate change target and embedding them in all the phases of the project lifecycle are very positive steps. Integrating this target in the corporate scorecard will be key. Lasting change in the mobilisation of commercial capital for climate-compatible infrastructure depends on making sure these considerations remain a central part of the bank's overall corporate strategy.

Sustaining leadership, political support and strong partnerships

DBSA has a central role in South Africa's ambitions for advancing sustainable development. Through its infrastructure efforts, DBSA has the added function of being a trusted interlocutor for government in its area of activity, as well as a critical link to South Africa's private financial system.

Overall, access to specialised green windows has been key in driving climate mainstreaming within DBSA, and for crowding-in private finance into new, climate-compatible infrastructure investments that are central for South Africa's development ambitions. The journey started with DBSA's management of the government's Green Fund. While DBSA had implemented climate projects before the Green Fund, through

this role, it was able to build dedicated capacity on climate change issues and learn how to structure and operate green projects. Its involvement in the Green Fund has allowed DBSA to position itself in the international arena and to secure GEF and GCF accreditation. These processes in turn help to further mainstream climate change considerations with DBSA. For instance, accreditation to the GCF was cited as one of the reasons behind the overhaul of the bank's Environmental and Social Safeguards policy in March 2018. Proximity to the GEF and GCF also led to the creation of the bank's climate change policy framework. On the flipside, this means that climate expertise was confined to a special unit. DBSA is taking steps to ensure that climate considerations are now part of every investment officer's toolbox, through capacity building and awareness raising.

DBSA finds itself at an inflection point, having embarked on a journey towards a greater focus on development results and catalysation that is ultimately changing its raison d'être and business model. In taking on its new role, DBSA will need to continue demonstrating its ability to play a central role in catalysing change effectively and well beyond its own financing. The institution has taken the critical steps of modernising the bank's reward and incentive structures – as reflected in corporate scorecards, targets and policies – which provide the direction and framework on which the banks' operations are based. Seeing this journey through requires lasting change and sustained effort based on strong leadership, vision and fit-for-purpose mandates. It also depends on sustained access to concessional funding sources for targeted investments to unlock broader change. In addition to DBSA's own efforts, stable and reliable resource partnerships will remain indispensable for delivering on the potential for catalytic impact.

References

Abramskiehn, D. et al. (2017), *Supporting National Development Banks to Drive Investment in the Nationally Determined Contributions of Brazil, Mexico, and Chile*, IDB: Washington DC, https://www.greenfinancelac.org/wp-content/uploads/2017/09/Supporting-National-Development-Banks-to-Drive-Investment-in-the-Nationally-Determined-Contributions-of-Brazil-Mexico-and-Chile.pdf (accessed on 25). [23]

ADB (2017), *Meeting Asia's Infrastructure Needs*, Asian Development Bank, Manila, Philippines, https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf. [27]

Andreão, G., H. Michelle and V. Miquel (2017), *Financing the expansion of photovoltaic power generation in Brazil: Challenges of using similar mechanisms for different renewable sources*. [12]

ANEEL (2017), *Informações Gerenciais*, Agencia Nacional de Energie Elétrica, http://www.aneel.gov.br/documents/656877/14854008/Boletim+de+Informa%C3%A7%C3%B5es+Gerenciais+-+4%C2%BA+trimestre+2017/44ee3035-27e5-0398-e7e3-c612ec4dc994. [68]

Barbosa, N. (2010), "Latin America: Counter-Cyclical Policy in Brazil: 2008-09", *Journal of Globalization and Development*, Vol. 1/1, http://dx.doi.org/10.2202/1948-1837.1052. [52]

Bloomberg New Energy Finance (2019), *The Clean Technology Fund and Concessional Finance*, https://data.bloomberglp.com/professional/sites/24/BNEF_The-Clean-Technology-Fund-and-Concessional-Finance-2019-Report.pdf. [13]

BNDES (2018), *Annual integrated report 2017*. [54]

BNDES (2018), *Green Bond Presentation*, https://www.greenfinancelac.org/wp-content/uploads/2018/05/3.-BNDES.pdf. [70]

BNDES (2018), *Historical data on BNDES' loan portfolio and interbank on-lendings*, https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Investor_Relations/Financial_Information/historical_data.html. [45]

BNDES (2018), *Multiannual Social and Environmental Responsibility Policy 2018-2020*. [59]

BNDES (2017), *Annual Report 2016*. [109]

BNDES (2017), *BNDES raises USD 1 billion in green bonds on the international market*. [69]

BNDES (2017), *Multi-Annual Implementation of the PRSA 2015-2017*. [57]

BNDES (2016), *BNDES divulga novas condições de financiamento à energia elétrica*, https://www.bndes.gov.br/wps/portal/site/home/imprensa/noticias/conteudo/bndes-divulga-novas%20condicoes-de-financiamento-a-energia-eletrica. [65]

BNDES (2012), *Financing Wind Power Development in Brazil*. [106]

BNDES (n.d.), *BNDES Finem: Distribuição de Energia Elétrica*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-distribuicao-energia-eletrica. [60]

BNDES (n.d.), *BNDES Finem: Eficiência Energética*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-eficiencia-energetica. [61]

BNDES (n.d.), *BNDES Finem: Geração de energia*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-energia. [62]

BNDES (n.d.), *BNDES Finem: Mobilidade urbana*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-mobilidade-urbana. [63]

BNDES (n.d.), *BNDES Finem: Saneamento ambiental e recursos hídricos*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-saneamento-ambiental-recursos-hidricos. [64]

BNDES (n.d.), *BNDES Finem: Transmissão de energia elétrica*, https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/bndes-finem-transmissao-energia-eletrica. [66]

Brazilian Panel on Climate Change (2013), *Scientific Basis of Climate Change. Contribution of Working Group 1 to the First National Assessment Report of the Brazilian Panel on Climate Change*, http://www.pbmc.coppe.ufrj.br/documentos/sumario-executio-ing-web-25-08.pdf. [31]

Butzbach, O. and K. von Mettenheim (eds.) (2016), *Alternative Banking and Financial Crisis*, Routledge. [44]

Byskov, S. and M. Clavijo (2017), *World Bank Staff Note: Understanding the Effects of the Taxa de Longo Prazo (TLP) Reform in Brazil*, World Bank Group, Washington, D.C., http://documents.worldbank.org/curated/en/597021501583059929/pdf/117812-WP-PORTUGUESE-AND-ENGLISH-PUBLIC-UnderstandingtheEffectsofTLPReforminBrazil.pdf (accessed on 1 October 2018). [55]

CBI (2017), *Bonds and Climate Change: The State of the Market 2017*. [111]

CFA Society Brazil (2016), *Infrastructure Debentures: Higher Demand through Regulatory Reform*, http://cfasociety.org.br/media/uploads/bsk-pdf-manager/cfa_policy_brief_for_brazil_sep_161217_en_89.pdf. [71]

Chawla, K. et al. (2018), *Risks in Renewable Energy Markets in Emerging Economies*. [100]

Climate Action Tracker (2013), *South Africa*, New Climate Institute, Ecofys, Climate Analytics, http://climateactiontracker.org/countries/southafrica/2013.html[20/04/201814:37:53]. [89]

Climate Transparency (2018), *Brown to Green 2018: The G20 Transition to a Low-Carbon Economy*, Climate Transparency, http://www.climate-transparency.org/g20-climate-performance/g20report2018. [94]

Corporatin, I. (ed.) (2017), *FC Partners with Brazil's Development Bank to Strengthen the Social and Environmental Considerations in its Project Financing Process*, [58]

https://ifcextapps.ifc.org/IFCExt/pressroom/IFCPressRoom.nsf/0/EA7780578DD878A9852581320063 7C36.

DBSA (2018), *Environmental and Social Safeguard Standards*, Development Bank of Southern Africa, https://www.dbsa.org/EN/About-Us/Publications/Documents/DBSA%20Environmental%20and%20Social%20Safeguard%20Standards%202018.pdf. [95]

DBSA (2018), *Sustainability Review 2018*. [96]

DBSA (2017), *2017 Integrated Annual Report: Driving Investment in Infrastructure*, Development Bank of Southern Africa, https://www.dbsa.org/EN/About-Us/Publications/Annual%20Reports/DBSA%20Integrated%20Annual%20Report%202016-17.pdf. [97]

De Luna-Martinez, J. et al. (2018), "2017 Survey of National development banks", No. 125958, World Bank, Washington DC, http://documents.worldbank.org/curated/en/977821525438071799/2017-Survey-of-National-development-banks (accessed on 26 November 2018). [6]

De Luna-Martinez, J. et al. (2018), "2017 Survey of National development banks", No. 125958, World Bank, Washington DC, http://documents.worldbank.org/curated/en/977821525438071799/2017-Survey-of-National-development-banks (accessed on 26 November 2018). [20]

Department of Environmental Affairs (2016), "Green-Fund-Impact-Study". [98]

EUROMONEY (2017), *Brazil set to pass critical credit reform*, https://www.euromoney.com/article/b14jmdbrg7n5z1/brazil-set-to-pass-critical-credit-reform. [56]

Faria, C. and C. Angelo (2016), *Brazil shifts funds from coal to solar power*, https://www.climatechangenews.com/2016/10/04/brazil-shifts-funds-from-coal-to-solar-power/. [10]

Fay, M. et al. (2015), *Decarbonizing Development: Three Steps to a Zero-Carbon Future*, The World Bank, Washington DC, http://dx.doi.org/10.1596/978-1-4648-0479-3. [18]

Federative Republic of Brazil (2015), *Intended Nationally Determined Contribution: Towards Achieving the Objective of the United Nations Framework Convention on Climate Change*. [34]

Frischtak, C. and J. Mourão (2017), "O Estoque de Capital de Infraestrutura no Brasil: Uma abordagem setorial", *Trabalho preparado para o IPEA no contexto do projeto "Desafios da Nação"*. [41]

Frischtak, C. et al. (2017), *TOWARDS A MORE EFFECTIVE BNDES*, The World Bank, Washington DC. [102]

Garcia-Kilroy Heinz Rudolph, C. (2017), *Private Financing of Public Infrastructure through PPPs in Latin America and the Caribbean*, World Bank Group, Washington, D.C., http://www.worldbank.org. [43]

Government of Brazil (2016), *Programa de Parcerias de Investimentos*, https://www.ppi.gov.br/about-the-program. [40]

Government of Brazil (2009), *National Policy on Climate Change*, Government of Brazil, Brasília, [38]

https://www.preventionweb.net/files/12488_BrazilNationalpolicyEN.pdf (accessed on 19 October 2018).

Green Climate Fund (2018), *Consideration of funding proposals-Addendum IX*. [99]

Hallegatte, S. et al. (2016), *Shock Waves: Climate Change and Development Series Managing the Impacts of Climate Change on Poverty*, The World Bank, Washington, DC, https://openknowledge.worldbank.org/bitstream/handle/10986/22787/9781464806735.pdf (accessed on 27 September 2018). [15]

IBGE, Pesquisa Nacional por Amostra de Domicílio (n.d.), *Séries Históricas e Estatísticas - Desenvolvimento Sustentável, Indicadores Ambientais e Sociais*, https://seriesestatisticas.ibge.gov.br/lista_tema.aspx?op=0&no=16 (accessed on 2018). [29]

IDFC (2017), *IDFC Green Finance Mapping Report 2016*, International Development Finance Club, https://www.idfc.org/Downloads/Publications/01_green_finance_mappings/IDFC_Green_Finance_Mapping_Report_2017_12_11.pdf (accessed on 22 April 2018). [24]

IFC (2016), *Climate Investment Opportunities in Emerging Markets*, International Finance Corporation, Washington, D.C., http://www.ifc.org. [32]

Instituto Nacional de Pesquisas Espaciais (2018), *Monitoramento da Floresta Amazônica Brasileira por Satélite*, http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes. [67]

International Monetary Fund (2018), *Regional economic outlook. Western Hemisphere: seizing the momentum*. [33]

IOL Business Report (2011), *'SA faces R1.5 trillion backlog'*, https://www.iol.co.za/business-report/economy/sa-faces-r15-trillion-backlog-1076824 (accessed on 17 October 2018). [76]

IRENA (2015), *Renewable Energy Policy Brief: Brazil*, IRENA, Abu Dhabi, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_RE_Latin_America_Policies/IRENA_RE_Latin_America_Policies_2015_Country_Brazil.pdf?la=en&hash=D645B3E7B7DF03BDDAF6EE4F35058B2669E132B1. [110]

Lazzarini, S. et al. (2015), "What Do State-Owned Development Banks Do? Evidence from BNDES, 2002-09", *World Development*, Vol. 66, pp. 237-253, http://dx.doi.org/10.1016/j.worlddev.2014.08.016. [53]

Liebenberg, S. (2000), *Human Development and Human Rights: South African Country Study*, United Nations Development Program, New York, NY, http://hdr.undp.org/sites/default/files/sandra_liebenberg.pdf. [85]

Lorenzo, J. and M. Netto (2013), *Public Development Banks and Climate Change Mitigation*, Inter-American Development Bank, https://publications.iadb.org/handle/11319/464. [5]

McNicoll, L. et al. (2017), "Estimating Publicly-Mobilised Private Finance for Climate Action: A South African Case Study", *OECD Environment Working Papers*, No. 125, OECD Publishing, Paris, https://doi.org/10.1787/a606277c-en (accessed on 19 October 2018). [25]

Ministério de Minas e Energia, S. (2017), *Plano Decenal de Expansão de Energia*. [35]

Ministério do Planejamento (n.d.), *Programa de Aceleração do Crescimento*, http://www.pac.gov.br/. [39]

Ministry of Environment (2016), *National Adaptation Plan to Climate Change: General Strategy*, Ministry of Environment, http://www4.unfccc.int/nap/Documents%20NAP/English_Brazil%20NAP%20Part%201.pdf. [37]

Ministry of the Environment, S. (2016), *ENREDD+: National REDD+ Strategy*, Ministry of the Environment, Brasília, http://redd.mma.gov.br. [101]

Miyajima, K. and T. Chan (2012), "Emerging market local currency bonds: diversification and stability"*, BIS Working Papers*, No. 391, Bank for International Settlements, https://www.bis.org/publ/work391.pdf. [81]

Morris, S. (2018), *Rising to the SDG Challenge - The Unique Contribution of the International Development Finance Club*, Center for Global Development, Washington DC, https://www.cgdev.org/publication/rising-sdg-challenge-unique-contribution-international-development-finance-club (accessed on 26 November 2018). [7]

Musacchio, A. (2009), *Experiments in Financial Democracy: Corporate Governance and Financial Development in Brazil, 1882-1950*, Cambridge University Press, http://dx.doi.org/10.1017/CBO9780511635427. [48]

Najberg, S. (1989), *Privatização de recursos públicos: os empréstimos do Sistema BNDES ao setor privado nacional com correção parcial*, https://web.bndes.gov.br/bib/jspui/bitstream/1408/12738/1/14BNDES%2C%20um%20Banco%20de%20Id%C3%A9ias_Transforma%C3%A7%C3%A3o%20do%20Sistema%20BNDES%20em%20Financiador%20do%20Setor%20Privado%20Nacional_P.pdf. [49]

National Business Initiative (2017), "South Africa: Policy Framework and Climate Change", https://www.nbi.org.za/wp-content/uploads/2017/11/DEA-NBI-Infographics-2-20171102-WEB.pdf. [88]

National Planning Commission (2012), *National Development Plan 2030: Our future - make it work*, https://www.gov.za/sites/default/files/NDP-2030-Our-future-make-it-work_r.pdf (accessed on 17 October 2018). [75]

National Treasury (2018), *Public-sector infrastructure update*, http://www.treasury.gov.za/documents/national%20budget/2018/review/Annexure%20D.pdf (accessed on 17 October 2018). [77]

OECD (2018), *Global Outlook on Financing for Sustainable Development 2019: Time to Face the Challenge*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264307995-en. [22]

OECD (2018), *Making Blended Finance Work for the Sustainable Development Goals*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264288768-en. [21]

OECD (2018), *OECD DAC BLENDED FINANCE PRINCIPLES for Unlocking Commercial Finance for the Sustainable Development Goals*, OECD Publishing, Paris, https://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/OECD-Blended-Finance-Principles.pdf (accessed on 13 May 2018). [72]

OECD (2018), *Survey of Large Pension Funds and Public Pension Reserve Funds*, http://www.oecd.org/finance/survey-large-pension-funds.htm (accessed on 26 July 2018). [16]

OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264273528-en. [2]

OECD (2017), “Mobilising financing for the transition”, in *Investing in Climate, Investing in Growth*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264273528-9-en. [17]

OECD (2017), *OECD Economic Surveys: South Africa 2017*, OECD Publishing, Paris, https://dx.doi.org/10.1787/eco_surveys-zaf-2017-en. [73]

OECD (2015), *Aligning Policies for a Low-carbon Economy*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264233294-en. [47]

OECD (2015), *State-Owned Enterprises in the Development Process*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264229617-en. [108]

OECD (2013), *OECD Environmental Performance Reviews : South Africa*, https://www.oecd-ilibrary.org/docserver/9789264202887-en.pdf?expires=1539841076&id=id&accname=ocid84004878&checksum=049DAB197F2286AF64E34A395284F008 (accessed on 18 October 2018). [83]

OECD/UN Environment/World Bank Group (2018), *Financing Climate Futures: Rethinking Infrastructure*, OECD Publishing, Paris. [11]

OECD, UN Environment and World Bank Group (2018), *Financing Climate Futures: Rethinking Infrastructure*, OECD Publishing, Paris, https://dx.doi.org/9789264308114-en. [1]

OECD, UN Environment and World Bank Group (2018), *Financing Climate Futures: Rethinking Infrastructure*, OECD Publishing, Paris, https://dx.doi.org/9789264308114-en. [3]

Oxford Economics and Global Infrastructure Hub (2017), “Global Infrastructure Outlook”. [78]

Pauw, W. et al. (2016), *NDC Explorer*, https://klimalog.die-gdi.de/ndc/#NDCExplorer/worldMap?INDC??income???catIncome (accessed on 25 March 2018). [90]

Presidential Infrastructure Coordinating Commission (2012), *A Summary of the South African National Infrastructure Plan*, https://www.gov.za/sites/default/files/PICC_Final.pdf (accessed on 17 October 2018). [74]

Radebe, J. (2018), *Opinion Piece*, Energy Research Centre, http://www.energy.gov.za/IPP/CityPress-Opinion-Piece-Renewable-Energy.pdf. [93]

Raiser, M. et al. (2017), *Back to Planning: How to Close Brazil’s Infrastructure Gap in Times of Austerity*, World Bank Group, Washington, D.C., http://documents.worldbank.org/curated/en/386151499876913758/pdf/117392-REVISED-PUBLIC-Back-to-Planning-How-to-Close-Brazil-s-Infrastructure-Gap-in-Times-of-Austerity-with-cover-page.pdf (accessed on 1 October 2018). [26]

Republic of South Africa (2015), *South Africa’s Intended Nationally Determined Contribution*, Republic of South Africa, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/South%20Africa%20First/South%20Africa.pdf. [91]

Republic of South Africa (2012), *National Development Plan 2030*, Republic of South Africa, https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf. [87]

Republic of South Africa (2011), *National Climate Change Response White Paper*, Republic of South Africa, https://www.environment.gov.za/sites/default/files/legislations/national_climatechange_response_whitepaper.pdf. [86]

Republic of South Africa Department of Energy (2018), "Integrated Resources Plan", http://www.energy.gov.za/IRP/2019/IRP-2019.pdf. [92]

Reuters (2018), *Brazil's BNDES plans to repay $40 billion to the Treasury in 2018*, https://www.reuters.com/article/brazil-treasury/brazils-bndes-plans-to-repay-40-billion-to-the-treasury-in-2018-idUSL1N1P307Y. [105]

Reuters (2016), *BNDES to repay Brazil Treasury debt with mix of cash, securities*, https://www.reuters.com/article/us-bndes-outlook/bndes-to-repay-brazil-treasury-debt-with-mix-of-cash-securities-idUSKBN13I29N. [104]

S&P Global Ratings (2017), *BNDES' Role in Brazil's Infrastructure Development Goes Beyond Subsidized Lending*. [103]

Sabbadini, R. (2018), "Overcoming the Original Sin: gains from local currency external debt", *Working Paper Series*, No. 484, Banco Central do Brasil, https://www.bcb.gov.br/pec/wps/ingl/wps484.pdf. [82]

Smallridge, D. et al. (2013), *The Role of National Development Banks in Catalyzing International Climate Finance*, Inter-American Development Bank, Washington DC, http://energy-base.org/wp-content/uploads/2013/11/IADB-The-Role-of-National-Development-Banks-in-Catalyzing-International-Climate-Finance1.pdf. [9]

South African Government (2013), *Minister of Finance Pravin Gordhan presents the 2013 Budget Speech*, https://www.gov.za/node/537651 (accessed on 18 October 2018). [107]

Stiglitz, J. and J. Lin (eds.) (2013), *The Industrial Policy Revolution I. The Role of Government Beyond Ideology*, International Economic Association. [51]

Studart, R. and K. Gallagher (2016), *Infrastructure for Sustainable Development: The Role of National Development Banks*, Global Economic Governance Initiative, Boston University, https://www.bu.edu/pardeeschool/files/2016/08/Infrastructure.Sustainable.Final_.pdf (accessed on 5). [4]

Sustainable Banking Network (2018), *Country Progress Report: Addendum to SBN Global Progress Report, Brazil*, International Finance Corporation, Washington, D.C., http://www.ifc.org. [36]

The World Bank (2018), *GDP (current LCU)*, https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=BR. [46]

TIPS et al (2018), *The Green Economy Barometer 2018: South Africa*, Trade & Industrial Policy Strategies and The African Centre for a Green Economy, Pretoria and Cape Town, http://www.greeneconomycoalition.org. [84]

UN Economic and Social Council (2018), *Progress towards the Sustainable Development Goals*, UN Economic and Social Council, New York City, http://undocs.org/E/2018/64 (accessed on 19 October 2018). [14]

Velasco, L. (2010), *A privatização no Sistema BNDES. Documento histórico*, [50]

https://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/revista/rev3309.pdf.

Venugopal, S. et al. (2012), “Public Financing Instruments to Leverage Private Capital for Climate-Relevant Investment: Focus on Multilateral Agencies”, World Resources Institute, Washington DC, http://www.wri.org/project/climate-finance-private-sector. [19]

Wagner, M., G. Bertol and A. Murphy (2014), *Enhancing Private Infrastructure Investment in Brazil*. [42]

Woetzel, J. et al. (2017), *BRIDGING INFRASTRUCTURE GAPS HAS THE WORLD MADE PROGRESS?*, http://www.mckinsey.com/mgi. (accessed on 18 October 2018). [79]

World Economic Forum (2017), *The Global Competitiveness Report 2017-2018*, World Economic Forum, Geneva, Switzerland, http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf (accessed on 1 September 2018). [80]

World Economic Forum (2006), *The Global Competitiveness Report 2006-2007*, World Economic Forum, Geneva, Switzerland, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2006-07.pdf. [28]

WRI (2014), *Three maps help explain São Paulo, Brazil’s water crisis*, https://www.wri.org/blog/2014/11/3-maps-help-explain-s-o-paulo-brazil-s-water-crisis. [30]

Yokota, J. et al. (2017), *BNDES’ Role In Brazil’s Infrastructure Development Goes Beyond Subsidized Lending*, S&P Global Ratings, https://www.spratings.com/documents/20184/1634005/CO_IFR_October11_2017_BNDESRoleInBrazilsInfrastructureDevelopmentGoesBeyondSubsidizedLending/996655f4-5b74-4572-aa19-789a81eb6fab. [8]

Endnotes

[1] Blended finance is the strategic use of development finance to mobilise additional finance for sustainable development in developing countries (OECD, 2018[21]).

[2] Brazil, Russia, India, China, South Africa.

[3] A new government will assume office on January 1, 2019.

[4] For instance, the promotion of social development was only added to the bank's mission in 1982 (OECD, 2015[108]).

[5] Prior to 2019 when the Ministry of Economy was created by merging the previous Ministry of Planning, Development and Management and the Ministry of Finance, BNDES was an entity within the Ministry of Planning, Development and Management.

[6] Funding from the Treasury was discontinued in 2015 and (partially) reversed. In 2016 and 2018, BNDES repaid BRL 230 billion, or USD 63 billion (BNDES, 2017[109]) (Reuters, 2018[105]).

[7] The market rate is measured by the overnight lending rate set by the Central Bank (Selic rate).

[8] Irrespective of the shape of its yield curve and the maturities of the loans granted by BNDES.

[9] The Programme to Incentivise Alternative Electricity Sources (PROINFA) was a hybrid scheme launched in 2002 that aimed to develop a total of 3,300 megawatts (MW) of renewable energy generation capacity (wind, biomass, small hydropower projects) (IRENA, 2015[110]).

[10] In April 2012, wind power projects received up to 80% credit, with a financing index of 100% TJLP and a basic spread of 0.9% per annum (BNDES, 2012[106]).

[11] Brazil's green bond market reached USD 3.7 billion in September 2017, while China issued USD 36.4 billion in green bonds in 2017 alone, India USD 4.6 billion and Mexico USD 4 billion (CBI, 2017[111]).

[12] This body is also responsible for developing and maintaining South Africa's National Infrastructure Plan, which sets priorities and aligns ministries with infrastructure goals.

[13] When a country is not able to raise funds on capital markets in its own currency, which exposes it to significant foreign exchange risks.

Financing Climate Futures

RETHINKING INFRASTRUCTURE

Governments recognise that scaling up and shifting financial flows to low-emission and resilient infrastructure investments is critical to deliver on climate and sustainable development goals. Efforts to align financial flows with climate objectives remain incremental and fail to deliver the radical transformation needed. The OECD, UN Environment and the World Bank Group, with the support of the German Ministry of Environment, Nature Conservation and Nuclear Safety, have joined forces under a new initiative – *Financing Climate Futures: Rethinking Infrastructure* – that provides a roadmap to help countries make the transformations in their infrastructure, investment and finance systems that are needed to make financial flows consistent with a pathway towards a low-emission, resilient future.

For more information on *Financing Climate Futures: Rethinking Infrastructure* visit: oe.cd/climate-futures

Scaling up climate-compatible infrastructure: Insights from national development banks in Brazil and South Africa

National development banks (NDBs) and development finance institutions – domestically focused, publicly owned financial institutions with a specific development mandate – are poised to play a role in bridging the investment gap for climate-compatible infrastructure in developing countries. But delivering on the Paris Agreement will require NDBs to transition from their traditional role as 'financer' to 'mobiliser' of investment for infrastructure, and to be better recognised in the international climate and development finance landscape. This paper highlights the role of NDBs drawing from case studies of the Brazilian Banco Nacional de Desenvolvimento Econômico e Social and the Development Bank of Southern Africa. As such, it provides important impetus to the international discourse on decisive climate action.

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