

Infrastructure financing in Africa: Overview, research gaps and research agenda

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The African Centre for Cities, based at the University of Cape Town, is a leading knowledge centre conducting meaningful research on how to understand, recast, and address pressing urban crises, particularly on the African continent. Since most urban challenges—for example, food security, climate change adaptation, economic inclusion, cultural vitality, and tolerance—are inherently interdisciplinary and spatially layered, ACC nurtures the co-production of knowledge favouring and cultivating critical Southern perspectives. Through its research ACC aims to develop imaginative policy discourses and practices to promote vibrant, just, and sustainable cities. This purpose has become all the more pertinent with the adoption of *Agenda 2063* at a pan-African level, which aligns with the 2030 global agenda for sustainable development.

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Executive Summary

Africa's development requires substantial investment in infrastructure systems, such as water, energy, and telecommunications. These systems are essential to ensuring that contemporary processes, like industrialization and urbanization, can be leveraged to create real and sustained value for cities, counties, regions, and global networks. One of the key questions underpinning this infrastructure challenge is how to finance these systems. Often focussing on the need for bankable projects and creditworthy institutions, debates about how to finance African infrastructure reflect an important and well-rehearsed argument that the key to addressing the infrastructure 'finance gap'—and thus unlocking Africa's infrastructure challenge—is overcoming the mismatch between investor expectations and the actual risk/return profile of infrastructure programmes and projects. This mismatch frames many useful projects as simply un-bankable, either because short-term returns are too low, or the risks are too high or not easily quantified and costed.

With the SDGs and other global agendas calling for more equality, climate responsiveness, and poverty alleviation, the development sector has been compelled to move beyond the frame of 'bankability' and ensure investments are sustainable and just. This requires deeper engagement with how financial logics—such as rating systems and assessment criteria—shape the sustainability of infrastructural outcomes. It also requires a recognition of current knowledge gaps, such as the lack of data on Africa and the weaknesses in our ability to make sense of this data in the context of rapid urbanization, digitization, demographic transition, and other important trends which have unique implications on the continent.

Intended to demonstrate these gaps and provide a scaffolding for future knowledge production, this report is structured into four parts. Part 1 provides an overview of the actors and instruments involved in infrastructure finance in Africa: how much different actors are investing, what kinds of financial mechanisms are used, and into what sorts of infrastructure sectors. Part 2 outlines the research issues that surface when trying to make sense of that data—going on to indicate where improvements could be made to strengthen both documentation and accountability. Building on the insights from Part 1 and 2, Part 3 offers a propositional and forward-thinking research agenda for infrastructure finance research in Africa. The report concludes by presenting two key areas for collective action. Following is a summary of the report's main sections:

Part 1: Actors and instruments: Although information about investment in Africa is scattered and difficult to consolidate, this section offers an overview of the actors involved in financing and delivering infrastructure in the continent, and of the emerging trends concerning financial mechanisms and the ways in which they play out in each major sector of investment. This high level overview shows that national governments are key actors in infrastructure finance, leveraging both their own revenue and loans. Multilateral and bilateral lenders are also major players, but they operate in a complex landscape of geopolitical ties and utilize diverse financial mechanisms that are often hard to chart. Blended finance and other emerging instruments which combine concessional and commercial elements reveal an increasing complexity of the project packages through which infrastructure is delivered. This brief map shows that existing available information is heterogenous and cannot be simply portrayed through numbers; richer qualitative reflections are needed to make makes sense of scattered and diverse documentation.

Part 2: Research issues in the African context: The gaps in our understanding of trends and patterns affecting investment in infrastructure in Africa reflect interrelated and systemic issues. Here, the report hones in on three important obstacles to building shared meanings, particularly among key financial actors, of sustainable infrastructure financing in Africa. First, there is an absence of commensurability and thus the interoperability of available datasets. That is, data collected by different actors utilizes different categories and metrics, making comparability difficult. Second, data is not always (in fact, rarely) collected by autonomous agencies. The need for autonomy and transparency of the research underpinning many of the existing outputs on the topic is clear. Finally, but no less importantly, the lack of fine-grained, localized data at the subnational level makes nuanced analysis difficult. This is particularly evident and important in the context of urban infrastructure, which pays the price of unrealized decentralization reforms, competing territorial governance, traditional lenders' opposition to funding subnational institutions, and an even greater dearth of data and research.

Part 3: Research agenda: There are many priorities whose study would, each in its own way, tackle the knowledge problem of sustainable infrastructure financing. This part of the report attempts to synthesize the most pressing imperatives. The first is capacitating research centres in Africa to engage the questions of infrastructure finance. As we show, African research institutions are rarely involved in setting priorities of international lenders, and could be

capitated to play a vital interlocuter role. A second necessity is understanding the increasingly important role and unique practices of non-OECD actors, such as China, India, and Arab countries. While players like the World Bank were once seen as the leaders of the African infrastructure investment agenda, a diversity of lenders (and donors)—often with divergent and even competing objectives—has proliferated, and needs to be better understood (and coordinated where possible). The third imperative relates to the need to take seriously key continental transitions already underway. Africa is changing rapidly. Urbanization, climate change, demographic transitions (e.g., youth bulge), industrialization, digitization, and other processes have direct and fundamental impacts on infrastructure, and a failure to account for them is at our own peril. The fourth imperative relates to the rise of alternative spatial and territorial formations, which may, over the decades to come, challenge the primacy of the nation state. That is, multi-country corridors, trans-border mega-cities, and/or regional natural systems reflect the interconnectedness of the pan-African infrastructural project, and point to the need for new governance formations that can attend to those infrastructural realities. Finally, the reality of existing infrastructural hybridity and diversity cannot be overlooked. Focussing exclusively on capital intensive mega-projects fails to acknowledge the diverse ways services are already accessed, as well as the wider social infrastructures that support human, cultural, and social wellbeing.

Conclusion: In conclusion, the report identifies two policy responses that would, in our view, serve the Research Agenda identified in this report. First, creating collaboration protocols that help Africa-based research institutions, financial actors (both private and publicly owned), local government, and other stakeholders to join forces, and, through dedicated channels, to design, define, and assess sustainable infrastructure projects over the long term. Secondly, we see a necessity to operationalize urban sustainable infrastructure financing through dedicated tools that respond to the twofold need of using small-scale testbeds and reframing the question of bankability by adopting innovative forms of risk-sharing.

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Acronyms

ACC: African Centre for Cities
ADB: Asian Development Bank
AfCFTA: African Continental Free Trade Area
AfDB: African Development Bank Group
AfDF: African Development Fund
AFESD: Arab Fund for Economic and Social Development
AGFUND: Arab Gulf Program for Development
AHG: Alfred Herrhausen Gesellschaft
AI: artificial intelligence
AIIB: Asian Infrastructure Investment Bank
AU: African Union
AUDA-NEPAD: African Union Development Agency and New Partnership for Africa's Development
CARI: China Africa Research Initiative
Chexim: China Exim Bank
DAC: Development Assistance Committee
DBSA: Development Bank of South Africa
DFI: development finance institution
DIB: Development Impact Bond
EBRD: European Bank for Reconstruction and Development
ECA: Export Credit Agency
EIB: European Investment Bank
ESG: Environmental, Social, and Corporate Governance
FDI: foreign direct investment
IBDR: International Bank for Development and Reconstruction
ICA: Infrastructure Consortium for Africa
ICT: Information Communication Technology
IJ Global: Infrastructure Journal
IsDB: Islamic Development Bank
JSE: Johannesburg Stock Exchange
MDB: Multilateral Development Banks
MENA: Middle East and North Africa
MIGA: Multilateral Investment Guarantee Agency
MOFCOM: Department of Foreign Assistance of the Ministry of Commerce
NDB: New Development Bank
ODA: official development assistance
OECD: Organization for Economic Co-operation and Development
OOF: other official flows
OPEC: Organization of the Petroleum Exporting Countries
PC: patient capital
PIDA: Programme for Infrastructure Development in Africa
PPI: Private Participation in Infrastructure
PPP: public-private partnership
RBL: Resource-Backed Loan
SDG: Sustainable Development Goal
SEZ: special economic zone
TDB: Eastern and Southern African Trade and Development Bank
WB: World Bank
WBG: World Bank Group

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Introduction

Common narratives concerning Africa's development ping-pong between frontier optimism and daunting pessimism. These extremes, of course, fail to account for the diversity, complexity, and possibility evident on the continent. In spite of all that has been achieved, and notwithstanding this need for nuance, **there is no question that Africa experiences severe deficits in infrastructure**. Drawing on commonly used definitions, infrastructure is the medium that allows a country, city, or settlement to function optimally. It includes operating systems and equipment to conduct energy, the movement of people, goods, data, and services, as well as water, sewage, and waste. The African Development Bank calculated Africa's infrastructure finance gap in the range of \$68bn–\$108bn in 2018 (AfDB, 2018). While the quantification of the infrastructure gap and its associated financial implications is both extremely variable and controversial, it is undeniable that the current backlog in investment and maintenance, as well as future needs of growing cities and industries, will require the mobilization of significant funds.

Now more than ever, attention is being directed at mobilizing, gearing, and leveraging finance for infrastructure in Africa. In the **African Union's Agenda 2063 - the Africa We Want**, the development of local and pan-African infrastructure systems is a key component of the vision set out for the next 50 years of multilateral co-operation (AUC, 2015). Flagship initiatives of *Agenda 2063* include several infrastructural projects, such as a high-speed train network, energy projects, and an Africa-wide broadband backbone (AU, 2021). This focus on infrastructure is reflected in actual infrastructure investment on the continent, which shows a significant growth trend until 2018 (the last available aggregate official information) (ICA, 2018; ICA, 2019). Increasingly important bilateral partners like China have also emerged to fund infrastructure. Through both aid programmes and commercial financial instruments, these newer players are diversifying both the actor landscape and tools used for investment (Brautigam et al., 2018). While all of these financing efforts are important, they remain small relative to current and future needs. Moreover, investment agendas between national governments, regional bodies, lenders, and donors have often been uncoordinated and overly focussed on specific sectors, leaving numerous gaps in terms of both financing and the infrastructure systems being financed.

Mobilizing funding to fill these gaps is undeniably necessary. However, **the substantive nature** of this gap-filling is of critical importance to the long-term viability of African development processes. In other words, where money comes from, how it is structured, where it is invested, and the sorts of projects it supports all matter. The nature of funding—as well as how investments in different sectors interact, both with one other and with the wider ecological and social systems—have direct implications for the value creation (or loss) that the continent will face. Moreover, investments made today create lock-ins, setting development pathways in often irreversible ways, both in terms of material development and debt repayment. This has proven true of colonial investments (as evidenced in those poorly maintained systems' lasting exclusionary impact), and will remain true for investments made now and into the future. As such, today's infrastructure investors must be attentive to the long-term impacts of their choices, which set often irreversible pathways into the future.

Part of a wider project led by ACC and AHG, this draft report aims to attend to this need by addressing questions of infrastructure investment in Africa, with a focus on sustainability. The report is aimed at decisionmakers involved directly in infrastructure investment, keen to ensure that their investments contribute meaningfully to Africa's sustainable development. Sustainability, as it is used in this report, relates both to the types of investments made (sustainable infrastructure), as well as the appropriateness and justness of fiscal and financial arrangements for these investments (sustainable finance).

This project **builds on the REframe Primer** (African Centre for Cities, 2020), whose central question was how to ensure that investment in Africa yields sustainable outcomes. REframe's context focussed on African cities as key sites of urban investment (see an overview of the urban challenges in Africa in UNECA, 2015). While REframe provides neither a definitive picture of what sustainable (urban) infrastructure looks like across each sector, nor a prescriptive roadmap for how to unlock finance, it does serve as **a launchpad for a rich conversation** about how to break the inertia of the current moment. That is, how to shift towards investments deploying technological systems that are low- or zero-carbon intensive, resource-efficient, employment-rich, and generative of diverse and just socio-ecological systems.

Underpinning the REframe Primer is an understanding that having failed to attend to the imperative of sustainability, **the current infrastructure investment models used in Africa run the risk of reinforcing path dependencies**. While the current excitement in African infrastructure portfolios may seem new and opportune—and indeed the world

should care about the future of Africa's infrastructural development—common approaches to investment do little to break from the past. For over a century—first as part of colonial empire building, and later under the auspices of global development projects—global investment in Africa has been extractive, leaving in its wake degenerating mega-projects, natural resource disasters, social unrest, ballooning debts, and fragmented governance structures. From shopping malls to mega-highways to mining towns, the current model connects the 'modern infrastructure ideal' with the risk-appetite of global capital. That is, this modernist narrative assumes that the most efficient way to address service demands and develop the continent is by developing large, centralized service networks, administered by semi-autonomous agencies/authorities. According to this simplified narrative, big projects, kept at arm's length from the (corrupt) politics and (slow) bureaucracies, incur lower quantifiable risk, enable economies of scale, and amplify potential returns. Popular with private sector and bilateral agencies, such investment choices oppose principles of sustainability and preclude the likelihood of more emancipatory and productive geo-political relationships for African states.

It is against this backdrop, and with the intention of improving our shared understanding of what is happening in Africa's sustainable infrastructure finance landscape, that this report is structured into the following three parts:

- **Part 1** synthesizes selected/key reports on financing African infrastructure, identifying the key instruments through which investments are made and who is involved. It also outlines some of the forward-looking finance trends and emergent instruments, such as green bonds. In this section, we show that there are numerous actors involved in financing infrastructure.

- **Part 2**, based on the preceding review, highlights key challenges related to African infrastructure investment data and research, as well as the major areas of the current knowledge gap. These challenges and gaps include issues such as incommensurability of data, transparency in reporting, subnational data gaps, and weak categorization of investment data.

- **Part 3** moves beyond the gaps in the data on finance, and flags several areas where collaborative work/research is needed. These proposed areas provide the building blocks for a potential research agenda, and include empowering Africa-based research institutions, understanding the modalities of infrastructure, working with key continental transitions (such as urbanization, industrialization, etc.), and supporting transnational infrastructure configurations and hybrid urban infrastructure investment.

Finally, and in conclusion, the report makes **the case for developing more robust partnerships for collaboration and experimentation**, presenting some early thinking on what a 'finance lab' might look like.

Part 1: Actors and instruments

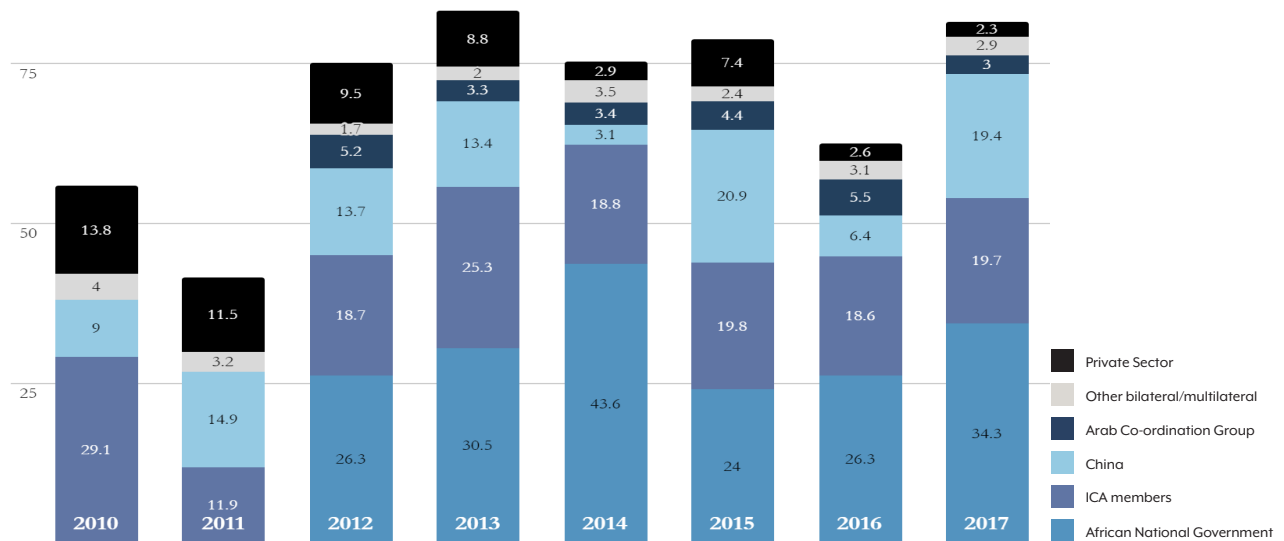
To provide a high level overview, this section covers the key actors involved in infrastructure finance in Africa and of the financial mechanisms they use to realize infrastructure investment. Making use of accessible data, this section draws on secondary material published by the Infrastructure Consortium for Africa (ICA), the World Bank Group (WBG), and other institutions that have attempted to consolidate information on infrastructure finance in Africa. As we will show, it is difficult to provide a single coherent narrative about who is involved in infrastructure finance, their relative contribution, and the implications of these arrangements.

1.1 Infrastructure finance actors

There are many actors involved in financing and delivering infrastructure in Africa. Chart 1 indicates the relative contribution of different financial actors, broken down between African nation states, members of the ICA, China, non-ICT bilateral and multilateral organization, the Arab Group, and the private sector. As we show later, Chart 1 provides one way of grouping actors; however there are many others. What this data shows is that, despite perceptions of weak African states, dominated completely by foreign investments, **national governments are in fact central players in infrastructure delivery**, accounting for between 24 to 44% of spending (ICA, 2018). This trend has been observed since at least 2012, when the ICA started including government-level data in their reporting on infrastructure spend (ICA, 2013).

Notwithstanding the importance (both quantitatively and qualitatively) of state investment, national infrastructure budgets are rarely built solely on local revenues, as all African countries have some form of international debt built into their fiscus. Support to national governments in the form of multilateral loans is evident when looking at **national debt statistics**, which documents this lending. In the last ten years, a general net debt increase has characterized both sub-Saharan and northern African countries (World Bank, 2021a, 2021b). African nations show

Chart 1: Infrastructure financing in Africa by year and source of funding, 2010-2017



SOURCE: Collated by the authors from ICA, 2018, 2017, 2013 & 2012 (pre-2012 ICA reports do not account for African government expenditure, and do not separate the Arab Group from non-ICA funders). 2011 and 2010 data are drawn from the 2102 reports.

Given the fungibility of these loans, it is difficult to determine clear links between national debt and particular infrastructure investments. However, it is likely that in countries with higher rates of national borrowing, there are implications for the role of lenders in the governance and infrastructural decision of those countries.

As debt statistics suggest, **Multilateral Development Banks (MDB)**¹ are a key group involved in financing infrastructure in Africa (see Chart 1, grey bar). MDBs' funding includes loans packaged into national government budgets, as discussed above, and in more direct forms, such as project finance. The best-known multilateral bank is the Washington DC-based World Bank Group, composed of five distinct institutions that provide different forms of financial assistance. Among them is the International Bank for Development and Reconstruction (IBDR), which has a near-universal reach with 189 shareholders. The first loan made to an African country was \$5 million, lent to the Ethiopian government in 1950 to improve road infrastructure. Since the 1950s, the IBDR has been instrumental in shaping the development trajectory of African nations, for example through structural adjustment in the 1980s. Despite the well-documented shift away from large-scale investments in the post-structural adjustment period, the World Bank is still an important investor in Africa, accompanied by a range of other multilateral banks. Global MDBs that operate in Africa include the Shanghai-based New Development Bank (NDB), the European Investment Bank (EIB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), and the Asian Infrastructure Investment Bank (AIIB).

Regional development banks—the most notable being the **African Development Bank Group (AfDB)**²—are also important multilateral players, shaping the agenda in Africa. AfDB was created in 1964 as an Africa-only institution. In 1973, the AfDB opened a concessional lending arm, the African Development Fund (AfDF), which allowed the participation of non-regional countries. In 1982, AfDB opened its membership to non-African countries. Today there are 26 non-African members, including major players such as the United States and China. The AfDB currently manages several separate funds, including the AfDF, the Nigerian Trust, the Arab Oil Fund, the Special Emergency Assistance Fund for Drought and Famine in Africa, and the Special Relief Fund. The AfDB provides concessional finance to middle-income and creditworthy nations in the region. In contrast, the AfDF focuses on low-income governments, and the Nigerian Trust exclusively funds projects (not governments) in low-income countries. AfDB is involved in the African Union through its Development Agency and New Partnership for Africa's Development's

¹ MDBs are international financial institutions chartered by two or more countries for the purpose of encouraging economic development, generally in low and middle income countries.

² Other examples include the Islamic Development Bank (IsDB), the Eastern and Southern African Trade and Development Bank (TDB), and others.

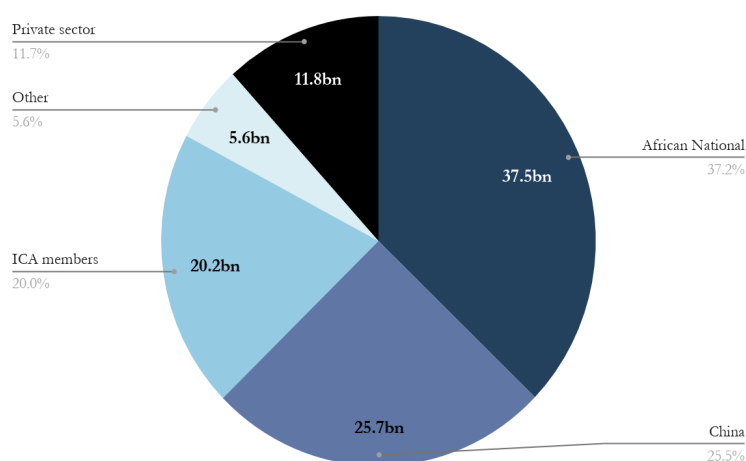
(AUDA-NEPAD) Programme for Infrastructure Development in Africa (PIDA). Also hosted by the AfDB, the Infrastructure Consortium for Africa (ICA)³ launched in 2005 as a tripartite association of bilateral donors, multilateral agencies, and African institutions. **ICA has been instrumental in collating data on infrastructure finance in Africa.**

In addition to multilateral institutions, **bilateral partners also contribute to infrastructure financing.** They do so in different ways: through the multilateral development banks of which they are shareholders; through dedicated bilateral development banks and agencies; through export-import banks in support of the private sectors' involvement; and finally, through direct loans to African governments, and the delivery of turn-key projects. In 2020, bilateral lending was more than double that of multilateral lending to Africa (Baker McKenzie, 2021). China is the world's largest bilateral official creditor, with a huge footprint in Africa. Other smaller bilateral lenders include Russia, India, and Turkey. Each country involved in bilateral agreements with African nations does so with their own incentives and long-term objectives, shaping the design of programmes and projects.

Finally, both the **African and the foreign private sector participate in the financing of infrastructure, in various ways: either through public-private partnerships (PPPs) or through fully private investments** (especially in the ICT sector, in which self-standing private investment in infrastructure like data centres is more common). Overall, private investment in Africa remains lower than in other regions, particularly in sub-Saharan Africa. While there has been an overall rise in investment as a proportion of GDP (from 10.4% in 1990 to 13.5% in 2017), the effect is more pronounced in particular countries, such as Ethiopia, Ghana, and Tanzania. Currently, there is a huge push to get private sector investment mobilized to address the shortfall in development finance in the wake of Covid-19 (IMF, 2021a).

According to the most recent ICA data (ICA, 2019), in 2018 infrastructure spending in Africa **crossed the \$ 100bn threshold.** As Chart 2 (below) shows, African governments were still the largest source, with commitments reaching 37.2% of the total, followed by China at 25.5%, ICA members at 20%, and the private sector at 11.7%. Following a peak between 2017 and 2018 (ICA, 2019), 2019 and 2020 saw a drop in bilateral and multilateral contributions. This drop was driven by both the impact of several election cycles across the continent (more than 20 elections were held in 2019) and the global Covid-19 pandemic (in 2020-2021), causing a slump in lending for infrastructure (Baker McKenzie, 2021). Despite this, signals of market resilience and recovery are already visible, and changes in the new US administration's foreign relations policies and the new political configuration in post-Brexit Europe, will no doubt affect lending and investment patterns for African infrastructure.

Chart 2: Infrastructure financing by main actors, 2018 \$

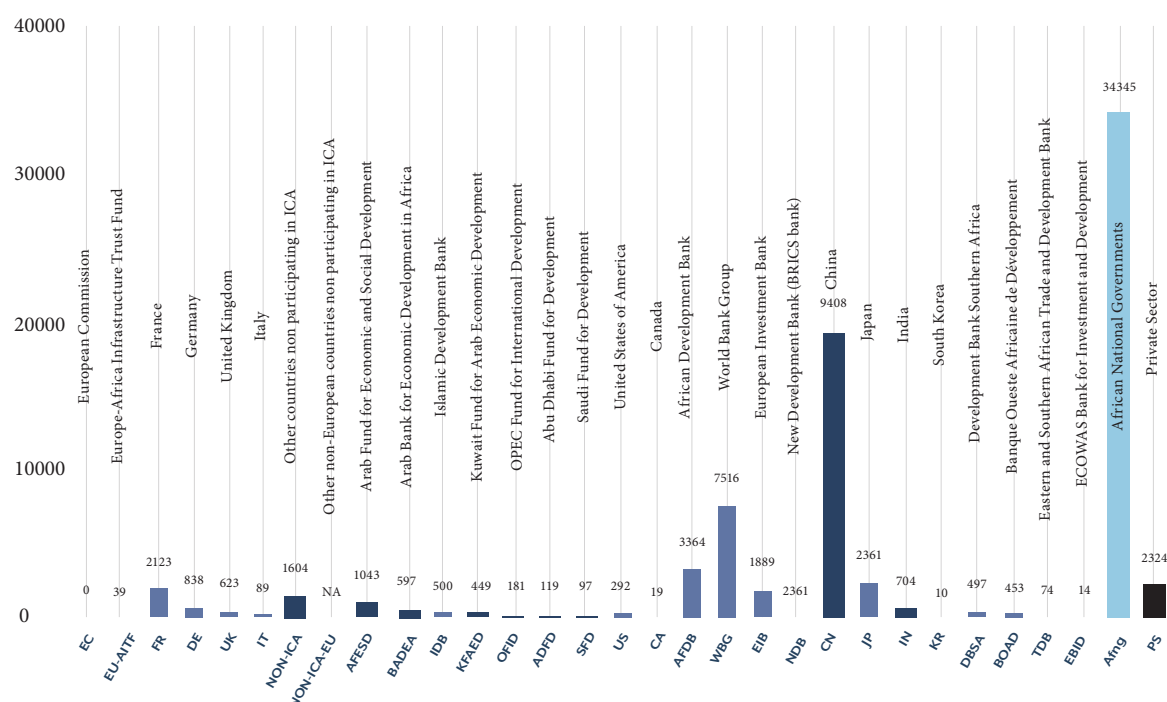


SOURCE: Adapted by the authors from ICA 2019.

³ The mandate of ICA is to encourage and promote increased investment in infrastructure in Africa, from both the public and private sectors (ICA, nd). Members include: G8 countries, two G20 countries (Spain and South Africa), African institutions such as the African Union Commission (AUC) and the African Union Development Agency (AUDA-NEPAD), MDBs (World Bank, AfDB, and others), and other financial institutions, such as Afreximbank. While not being a funding agency in and of itself, the ICA is a key platform that produces knowledge and standards in the financing of infrastructure projects and programmes across the continent. It does so through initiatives such as the Project Preparation Facilities Network and the publication of annual reports on the state of infrastructure financing in Africa (ICA, nd).

Chart 3 (below) provides a more detailed look at bilateral and multilateral lending for Year 2017 (ICA, 2018). In this chart, individual countries and multilateral groupings are both represented. This makes it difficult to undertake easy comparison as some countries may be listed individually and again in the groupings. This also points to the need to understand the **geopolitical configurations and groupings** of multilateral and bilateral financing contributions in order to develop a clear picture of both what is happening and why. International actors can be “grouped” through transnational collaborative agreements, which shape their investment behaviours; for example, by crafting joint investment agendas, or by enrolling members in existing global development commitments (e.g., the Sustainable Development Goals⁴, Environmental, Social, and Corporate Governance (ESG) reporting criteria⁵, etc.). How these actors are grouped (and ungrouped) is instrumental for understanding by whom and how infrastructural decision-making is happening in Africa.

Chart 3: Infrastructure funding in Africa by country/institution, \$m 2017



SOURCE: Readapted by the authors from ICA 2018

Building on Chart 2 and 3, Figure 1 (below) provides another way of mapping and grouping infrastructure investment in Africa. These include the OECD members, coordinated by the Development Assistance Committee (DAC)⁶, the members of the ICA, multilateral banks, and the Arab Reference Group⁷.

4 The 17 Sustainable Development Goals (SDGs), were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

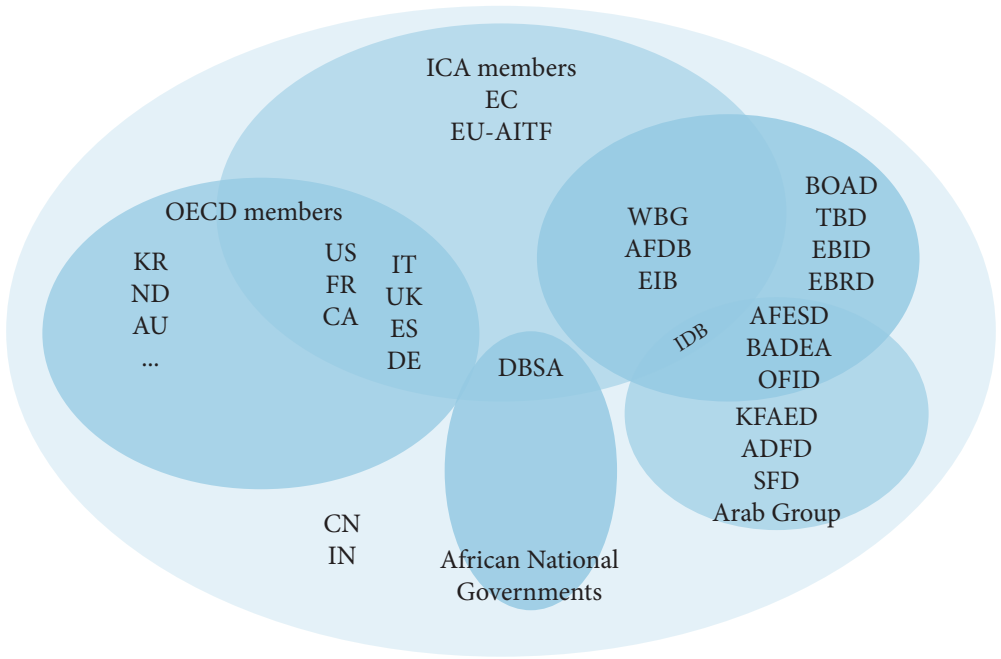
5 Environmental, Social, and Corporate Governance refers to the three central factors in measuring the sustainability and societal impact of an investment in a company or business.

6 Within the Organization for Economic Co-operation and Development (OECD), the DAC (Development Assistance Committee) was created in 1960 and features 30 member countries. The current mandate of the DAC is “to promote development co-operation and other relevant policies so as to contribute to implementation of the 2030 Agenda for Sustainable Development, including sustained, inclusive and sustainable economic growth, poverty eradication, improvement of living standards in developing countries, and to a future in which no country will depend on aid” (OECD, nd 1). In practice, the main activities of the DAC include: monitoring, assessing, and reporting the provision of aid by its members; policy review and standard setting; peer reviews of member countries; and analysis and promotion of best practices to support the current mandate. The standard-setting activity of the DAC is particularly important because it provides the current definition of official development assistance (ODA), as separated from other official flows and foreign direct investments (see Table 1). As part of the harmonization of ODA measurement, in 2019, DAC adopted the grant equivalent system as standard, making OECD-country’s grants and loans more accurately comparable in ODA statistics (OECD, nd 3).

7 Established in 1975 within the Kuwait-based Arab Fund for Economic and Social Development (AFESD), a multilateral organization founded by the states of the Arab League in 1968, the coordination Group “developed from the need, identified by the members, to consult and optimize the application of resources and the giving of aid by the various Arab Development Funds” (Arab Fund, nd). The main initiatives of the coordination group include the coordination of financing efforts by Arab multilateral lending institutions, collaboration on programmes that would exceed the capacity of a single bank, and harmonization of development assistance by Arab League nations. The Coordination group also produces standardized model agreements for development projects to be used by its members. Currently the group includes 11 members, both domestic development institutions (the Abu Dhabi Fund for Development, the Kuwait Fund for Arab Economic Development, the Qatar Fund For Development, the Saudi Fund for Development and the Iraqi Fund for External Development) and six multilateral organizations including: the Arab Bank for Economic Development in Africa, the Arab Fund for Economic and Social Development (AFESD), the Arab Gulf Program for Development (AGFUND), the Arab Monetary Fund, Islamic Development Bank, and the OPEC Fund for International Development.

Notably, actors such as China and India do not belong to any of these groupings. Equally important is that some of these institutions can be grouped within different categories at the same time. For example, the Islamic Development Bank is a multilateral lending bank, with two African countries among the top five shareholders (Libya and Nigeria), a member of the Arab reference group, and a member of the ICA. The implications are that easy comparison among groups is not possible as overlaps blur the picture of relative contribution. It is thus vital, to understand how actors are grouped, where there is overlap, why they are grouped in this way, and where investment patterns are more or less comparable. It is also vital to understand what power and influence—as well as accountability systems and checks—come from being part of particular financial and institutional groupings.

Figure 1: Landscape of public funding bodies



SOURCE: Collated by the authors using different sources, including ICA 2018. Development Bank of South Africa (DBSA) is classified as a domestic development bank but might also be classified as a Development Finance Institution (DFI). The use of ‘...’ reflects that there are more members represented than shown in the example.

While these charts and table provide a useful and quick overview of how different players compare in the infrastructure financing landscape, they also exposes reporting gaps. For example, some bilateral partners like the US or Canada, whose footprints seem relatively small in comparison to others, are key major contributors and shareholders to multilateral banks. In addition, the above data (and all of the data presented in this report) reflect particular assumptions about what is and is not part of investors’ ‘infrastructure spend’. For example, in the ICA dataset, only selective parts of the World Bank Group’s finance footprint are calculated. For example, guarantees provided by the WBG’s Multilateral Investment Guarantee Agency (MIGA) are not counted as infrastructure financing by the ICA, despite arguably being a form of financing. Overall, while a high-level comparative overview is possible, care must be taken when approaching the quantitative metrics and comparisons. It is clear that there is a wide range of actors involved in financing and funding infrastructure in Africa, but there are significant gaps in our knowledge about the financing these actors provide, and their relationship to one and other and the countries they lend to. In the following section we explore the tools used by these actors.

1.2 Infrastructure financing instruments

As elsewhere, infrastructure financing in Africa is made possible by **three forms of financing: debt, equity, and blended finance**⁸. Overall, the cost of debt tends to be lower than equity, with blended finance costs highly variable dependent on its structuring. As shown in Table 1 (below), debt can be further broken down between bonds and loans and equity financing, between those traded on a listed market and those that are unlisted.

8 Blended finance refers to capital raised by a mix of debt and equity, or through other instruments (such as convertible bonds) that can be converted into either of the two. In recent years, the concept of blended finance has expanded to characterize financial packages that combine debt or equity with grant or concessional components.

Table 1: Taxonomy of debt, equity, and mixed instruments used for infrastructure financing

Asset Category	Type of instrument	Examples of instrument	Market vehicles	Example of programme
Debt	Loans	Syndicated loans, Syndicated project loans, Securitized loans, Collateralized loans, Direct lending, etc.	Loan Indices, Debt funds	Most African countries have lending facilities with multilateral organizations like the World Bank.
	Bonds	Project bonds, Municipal bonds, Sub-sovereign bonds, Green bonds, etc.	Bond indices, Bond funds	Cape Town and Johannesburg have used green bonds to develop infrastructure.
Blended	Hybrid	Subordinated loans/bonds, Mezzanine finance, Convertible bonds, Preferred Stock	Mezzanine Debt Funds, Hybrid Debt Funds	China used debt-equity swaps in their infrastructure deals in the continent (Brautigam, 2020).
Equity	Listed	YieldCos, Infrastructure and Utility stocks, Real Estate Investment trusts, Independent Investment Trusts, Master limited partnerships, Closed-end funds	Listed Infrastructure funds, Equity funds, Trusts, Equity indices, Exchange-traded funds	African investment banks offer a number of listed investment options traded on JSE or elsewhere.
	Unlisted	Private-Public Partnerships (PPPs), Direct or co-investment in infrastructure equity, or corporate equity.	Unlisted infrastructure funds	AfDB's Africa50 fund provides a platform for both venture and equity finance in PPI projects.

SOURCE: Simplified by the authors drawing on OECD 2015. Note: We hope that the roundtable participants will assist us to find interesting examples to include in the table from Africa.

Loans and bonds are much more common forms of infrastructure finance in Africa, however, blended finance approaches are attempting to draw the private sector into financing efforts.

Another important distinction for understanding infrastructure **financing is the extent to which the cost of borrowing itself is subsidized. This discussion requires a clarified understanding of the difference between commercial loans, concessional loans, and grants.** While a commercial loan is costed based on perceived market risks and returns, official overseas development assistance (ODA)⁹, for infrastructure and more widely, can take the form of grants, where financial resources are provided free of interest and with no provision of repayment, or concessional loans, where the interest rates are lower than commercial rates and/or repayment schedules are longer. These tend to be administered by different agencies; for example China's foreign assistance consists of the first two types of credits, i.e., grants and interest-free loans disbursed by the Department of Foreign Assistance of the Ministry of Commerce (MOFCOM) and concessional loans (youhui daikuan) disbursed by the Department of Preferential Loans of the Exim Bank of China (Chexim). The former is capitalized by the government's tax revenue whereas the latter uses mostly Chexim's self-raised funds (Chen, 2020).

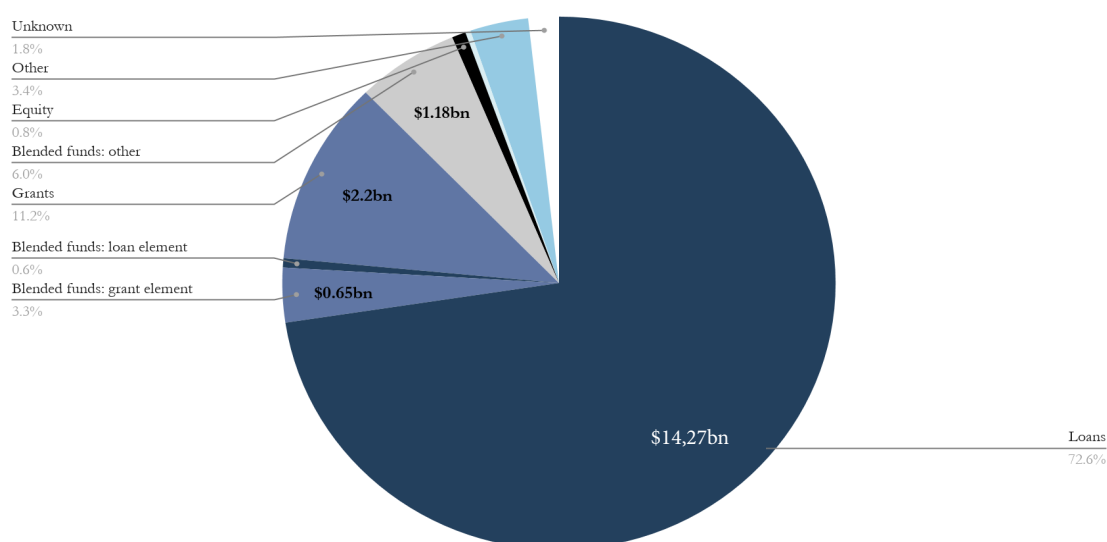
Linked to the issue of subsidization, blended finance is increasingly important in the infrastructure finance space in Africa. There are two possible definitions of blended finance. The basic definition refers to the blending of debt and equity (examples in Table 1). The second definition refers to “the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries” (OECD, nd 2). This type of blended finance is focussed on using governments and multilateral lenders' concessional or grant components to

⁹ The OECD's development assistance committee defines four types of financial flows: official development assistance (ODA), other official flows (OOF), foreign direct investment (FDI), and mixed or hybrid flows. This distinction acknowledges the fact that financial flows are not just differentiated on the basis of their financial characteristics, but also on the basis of the extent to which they are subsidised as a form of development assistance and international aid.

de-risk investments and thus attract private and commercial funding. In this sense, blended finance is also called “catalytic capital”, and can be structured in a range of ways (Convergence, 2020). This definition is the most commonly used in the infrastructure finance/DFI space. Convergence (2020) identifies **four mechanisms** through which blending takes place: Public or philanthropic funds at below-market rates within the capital structure, lowering the overall cost of capital; Public or philanthropic credit enhancement through guarantees or insurance at below-market rates; Grant-funded technical assistance facility pre- or post-investment; and Grant-funded transaction design or project preparation. In other words, the blended element (grant, loan, guarantee, etc.) can be part of the structure of the financial mechanism itself, can be within it as an insurance or guarantee, or can be entirely external, as in the case of a grant dedicated to project preparation. **Blended finance, defined this way, always includes a concessional element.**

To account for blended finance and make grants and different types of loans comparable, the **DAC recently introduced the grant equivalent system, which calculates the concessional element of each financial flow.** While the grant equivalent system only applies to member countries’ reporting, it allows for a deeper engagement with concessionality in lending. Chart 4 captures the share of 2017’s commitments by ICA members and shows that at least 20% of financing contained concessions of various sorts.

Chart 4: ICA members' 2017 commitments by type of funding, \$bn



SOURCE: Readapted from ICA 2018

Understanding **the role of concessional finance** in African infrastructure is important for several reasons. First, as shown in Chart 4, external funders¹⁰ that provide loans or grants represent the majority of infrastructure investment, even though the major investors remain African governments. In this sense, even if key players like China do not subscribe to OECD and are not part of ICA, their loans and export credits can still be characterized according to their grant component and level of concessionality (e.g., Brautigam, 2011). Second, the conditions attached to concessionality are an important element of infrastructure funding because they determine what kind of project may or may not be financed. Conditions may be very different: from environmental and social impact requirements to procurement rules that each lender may include as a condition for the borrower. Other concessional flows, such as export credits, which do not qualify as ODA concessional loans, can still be used to indirectly fund infrastructure through the conditional purchase of goods and services from the lending country (this is usually called “tied aid”). Third, the risk profile of infrastructure projects is highly dependent on the concessionality of their underlying financing mechanisms. Put differently, grant components can be used to leverage other funds, including private investments, by de-risking projects that would otherwise be too exposed for private equity participation (Convergence, 2020). Lastly, a good percentage of new infrastructure provision by external sources in Africa tend to rely on concessional elements.

¹⁰ That is, any funding that is not counted as national or subnational government, such as World Bank loans or instruments that qualify as ODA

1.3 Trends by sector and delivery mechanisms

These **investment types (e.g., debt, equity, etc.) shore up differently across sectors**. Different infrastructure sectors attract different types of funding from multi- and bilateral financial institutions. In the sectors where private funding is more consistent, equity is a more significant form of investment than in other sectors dominated by loan and/or grant instruments (ICA, 2018). As can be seen in Table 2, equity features strongly in ICT projects (i.e., 52.3% of the total according to ICA 2017 data). Conversely, in 2017, grants featured most heavily in the transport sector (with \$287m in 2017 compared to \$12m in the water sector and \$11m in the energy sector) (ICA, 2018).

Table 2: Types of financing tool by sector, \$m, 2017 (Excludes ICA, African National Governments and Private sector¹¹)

USD Millions	Transport	Water	ICT	Energy
Loans	5,138	2,664	502	11,241
%	94.7	99.6	57.7	98.0
Grants	287	12	-	11
%	5.3	5	-	.1
Equity	-	-	550	-
	-	-	52.3	-
Lines of credit/export credit/blended				216
%				2.8

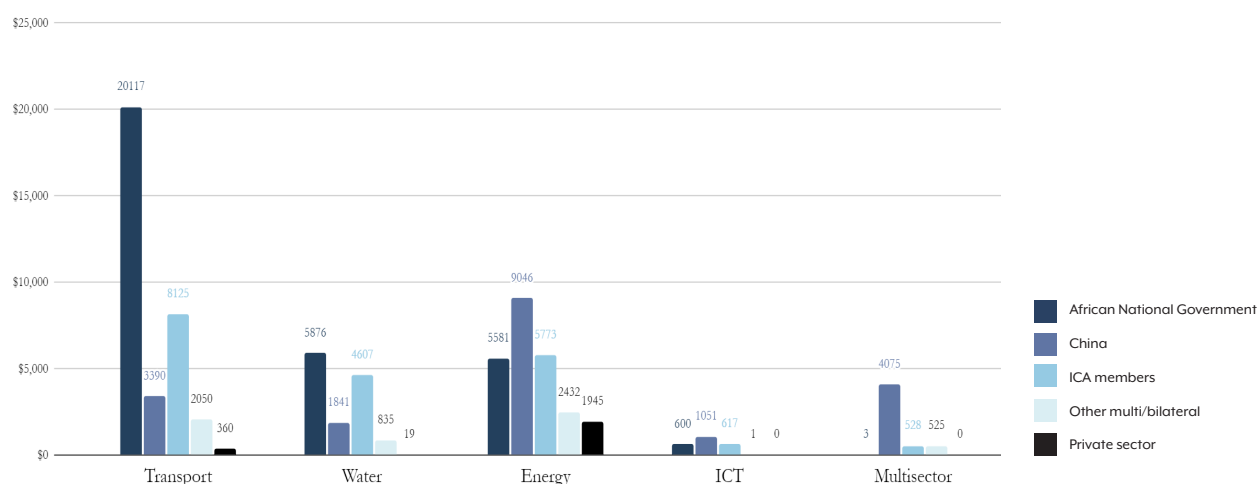
SOURCE: ICA 2018. Notably, these graphs should be looked at in conversation with other datasets.

This dataset, while useful, has some limitations. While the above data suggest that there is little or no equity in the energy space, a quick review of energy projects reported in the PPI World Bank database shows the opposite: equity often is used for financing energy projects. We also know that China uses export credits for road construction, for example, so the fact that these are not counted in the transport category also speaks to the limits of these datasets. This points to the importance of understanding the methodologies used to collect and document spending, as there are clearly mismatches between datasets resulting from differential categorization.

Chart 5 (below) shows that **different actors prefer different sectors**. For example, transport investments are dominated by national government spending, whereas energy is dominated by the private sector and China. Consistent with ICA data in Chart 5, World Bank data in Chart 6 shows the preference of the private sector to partner in energy projects. In the 2010-2019 decade, for example, Private Participation in Infrastructure (PPIs) for electricity projects listed in the World Bank database amounted to more than \$36bn compared to about \$11bn for transport, more than \$2bn in ICT, and less than \$500m in water and sanitation projects.

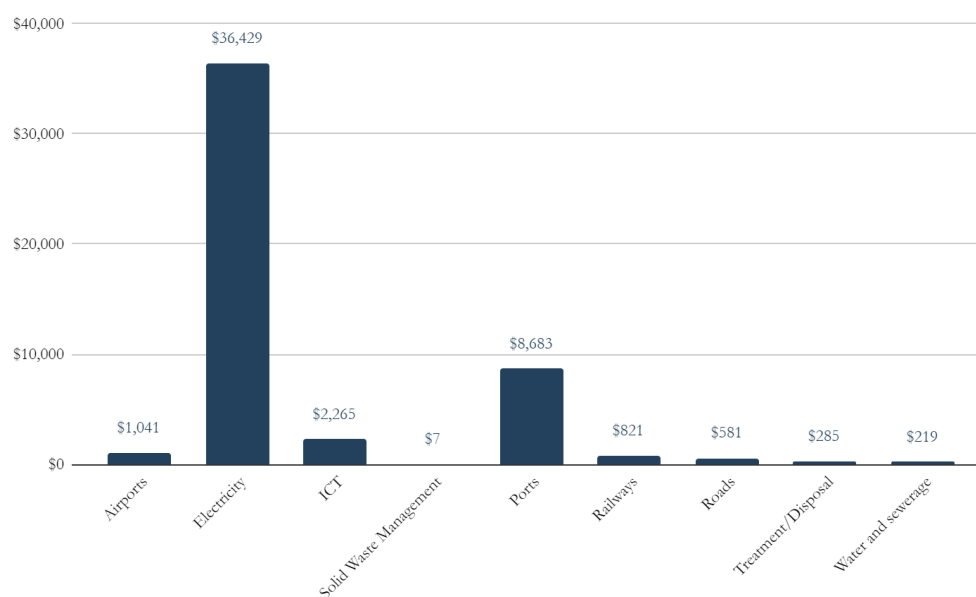
¹¹ This data includes non-ICA members such as EBRD (European Bank for Reconstruction and Development), Arab Group banks, China, India, Holland, Sweden, South Korea, and others. More information is needed to understand why ICA members and other important contributors were not included in this dataset.

Chart 5: Infrastructure financing by sector, \$m, 2017



SOURCE: ICA 2018

Chart 6: PPI World Bank, 2010-2019 for sub-Saharan Africa (excludes MENA countries), \$m.



SOURCE: Elaborated by the authors (<https://ppi.worldbank.org/en/snapshots/region/sub-saharan-africa>.)

Overall, trends in sector-based investments provide some indication of the sorts of projects and programmes that are likely to attract lenders and investors, and the sorts of concessionality which might be placed on these loans. However, the quality of the data gives us little information about the development effect of these investments. It is also difficult to tell from this data what these sector investments serve: for example, whether new electricity production or increased broadband is primarily in service of logistics and industry, or also aims to serve local economic development. It is also not possible to tell if these investments are in sustainable technologies, or conventional resource-intensive modes. More multi-scalar and geographically disaggregated information is clearly needed.

1.4 Emerging financing mechanisms in the African infrastructure context

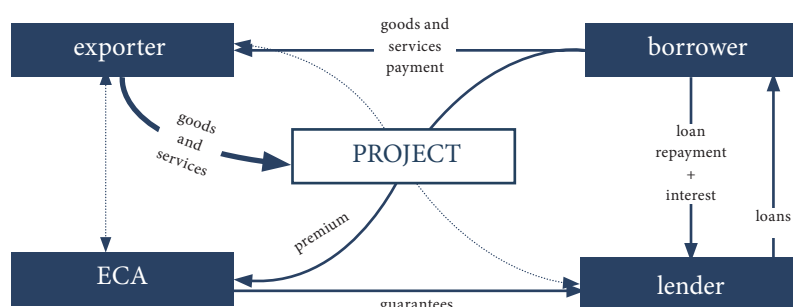
Given the complex landscape of financing tools, investor preferences, and investment patterns on the continent, in this section we highlight some of the key emerging trends that deserve further research attention in terms of the instruments themselves, their financial characteristics, risk profiles, and possible implications for long-term

sustainability. These trends are: export credits; natural-resource collaterals; and impact finance/patient capital. While this is not a complete picture of all the instruments that are useful to explore, it provides insights into some of the key debates in the contemporary African context.

The role of Export Credit Agencies (ECAs) in African infrastructure: An export credit agency (ECA) provides financial services to facilitate domestic companies' international exports. While the use of ECAs is new, it may rise in importance in the coming years. As Rundell (2018) outlines, ECA finance “offers a better deal for African sovereigns, beating bonds on tenor and price and tapping long-term, stable credit providers rather than fairweather friends in Africa's capital markets.” (np). Many countries have ECAs that provide loans, loan guarantees, and insurance to de-risk the uncertainty of exporting to African countries. ECAs can also serve as “policy banks”, as they align to a national government's foreign and domestic policy priorities. Some of the most important ECAs include the US Eximbank, China's Chexim (China Exim Bank), and EU countries' export credit agencies, all operating under different mandates and fundraising mechanisms. In addition, multilateral and commercial banks also exist to provide these kinds of export credit services (for example, the World Bank's MIGA provides Political Risk Insurance in a way that is similar to national ECAs).

While the primary aim of export credit services, such as loan guarantees and risk insurance, is to facilitate foreign direct investment, they can also be used for project finance in other countries. In practice, project finance deals can include ECA services to buy necessary supplies to deliver the infrastructure on the ground. Project finance featuring ECAs is increasingly used as tool of investment, with China's Chexim at the forefront of this financial trend, particularly for energy projects in Africa. However, there is also documentation of use of ECAs for roads, bridges, hospitals, and other investments (Rundell, 2018). An example of an ambitious project supported by Dutch ECA Atradius Dutch State Business NV is a land reclamation project in Luanda, Angola, of \$400m¹². The most common insurance products used by ECAs to aid infrastructure projects are political risk insurance, and/or commercial cover.

Figure 2: Project financing supported by an ECA



SOURCE: Compiled by the authors

In the scheme portrayed in the above diagram¹³, foreign direct investments are promoted through project-based deals, in which the ECA country supplies the raw material used in the project and, in most cases, the contractors who undertake the projects. More research is needed on the terms of these deals, particularly assumptions about risk and its cost.

Natural resource-backed infrastructure loans and the “Angola mode”: Africa's history of natural resource extraction is endemic, and continues to play out in the current trend of Resource-Backed Loans (RBLs). **RBLs are credit lines** provided to a government or a State Owned Enterprise, whereby repayment is either made directly in natural resources (in kind) such as oil or minerals, or from a resource-related future income stream. In certain cases, the terms of the RBL only involve resource-related income streams as a repayment guarantee or as a collateral¹⁴ (Mihalyi et al., 2020).

¹² <https://www.vanoord.com/en/updates/contract-awarded-land-reclamation-angola/>

¹³ Typically, these guarantees protect the lender in the event of any default in payment by the buyer or the borrower under a loan agreement. The premium falls on the borrower, as shown in Figure 2, while the exporter receives some kind of preferential benefit in the financial package—such as contractually obligated percentages of supplies to be bought from the ECA country, or preferential channels for contractors from the ECA country.

¹⁴ In these cases, if the recipient country or SOE cannot meet the terms of the repayment, the resource is then used to the benefit of the lender and according to the different possible contractual obligations that designate part of the resource as a guarantee or collateral.

RBLs are typically earmarked for specific projects (usually infrastructure or mining explorations), and often include further spending obligations, for example the involvement of contractors from the same state as the lender. The most well-known case of RBLs in Africa is China's investment in Angola. Based on an undisclosed agreement giving China preferential access to Angola's oil, RBLs are often known as the "Angola mode" (Alves, 2013). In this model (which in reality varies greatly depending on the country, see Brautigam, 2011) the funding of infrastructure is contingent on two criteria: the use of a resource as repayment or collateral; and the use of contractors from the lending country. It is important to note, however, that although China is the largest actor in RBLs (Mihalyi et al., 2020), it is not the only one. Equally important, not all RBLs are backed by minerals or fossil fuels: in fact, resource-poor African countries have also received loans guaranteed by other types of commodities, including cocoa, tobacco, and sesame seeds (Brautigam, 2011). More research is needed on the medium-term impacts of resource-backed loans, especially the elements that are not transparent, such as the actual cost—both financially and politically—of these loans.

The role of impact finance and patient capital: Most infrastructure projects are long-term investments. In the African context, end users' ability to pay for services is also limited, curtailing the scope for financial returns. Typical banks are, of course, not formatted for the requirements of infrastructure, both in terms of timeline and risk/return ratio. Therefore, another important trend to consider in the landscape of infrastructure financing in Africa is the role of impact investment. The spectrum of impact investing is very wide (GIIN, 2016), as it involves several different asset classes and return profiles. In general, it can be defined as encompassing all *"investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return"* (GIIN, 2019, p.1). What differentiates impact investing from more traditional philanthropic capital is the expectation of a financial return, which is often below market rate, or risk-adjusted, or delayed. In this sense, one of the key asset groups for infrastructure financing is what goes under the name of "patient capital" (PC). Generally speaking, PC is equity or debt *"whose providers aim to capture benefits specific to long-term investments and who maintain their investment even in the face of adverse short-term conditions"* (Deeg & Hardie, 2016). In other words, PC in the context of impact investing for infrastructure reflects 1) a long-term horizon, 2) a high-risk tolerance, and 3) a goal to maximize social and environmental goals alongside financial returns in the investment (Bertha Centre, 2015). Sitting between private and blended finance, impact investing in the various forms of PC is considered suited for infrastructure investments in long-term transitions enabled by so-called "low-carbon" or "climate finance" (Campiglio et al., 2017).

In the context of infrastructure financing, **bonds are increasingly being used as impact investing tools**. Without delving into further classification of bonds, two types of alternative debt instruments deserve attention in the context of sustainable infrastructure financing: **Development Impact Bonds** and **Green Bonds**. Development Impact Bonds (DIBs) are a particular form of social impact bond. In a traditional social impact bond, the government enters into a debt relationship with a provider of services whereby an external investor (usually philanthropic) provides the upfront capital (Bertha Centre, 2015). In the case of a DIB, it is a DFI that pays for the outcome through the issuing of a bond instrument. DIBs have been mostly used for small service delivery rather than for funding large technical systems (CGD & SF, 2013). In contrast, green bonds are generally used to finance green infrastructure projects that are large scale and capital intensive (Climate Bonds Initiative, 2015). The issuance of green bonds comes with additional expenses, for example for, defining the green criteria, monitoring and maintaining the proceeds as green, and transparent communication around performance to investors over the lifetime of the bond (Ernst & Young, 2016). In Africa, the South African case of green bonds is the most advanced. As of 25 October 2017, the Johannesburg Stock Exchange has a special 'Green Bond Segment', which provides a platform for organizations to raise funds ring-fenced for low carbon initiatives (Williams & Blumenthal, 2014). Eligible projects include, but are not limited to, renewable energy, energy efficiency, sustainable waste management, sustainable land use, biodiversity conservation, clean transportation, clean water, and various climate adaptation projects. There is clearly more research needed on how to mobilize patient capital towards African infrastructure, recognizing the need for financial returns as well as the commitment to impact (however this is measured).

Part 2: Research Issues in the African context

While the previous sections provided an overview of infrastructure investment patterns in Africa drawing on secondary sources, much work is still needed to create a coherent picture of what is happening in terms of infrastructure investment in Africa. There are several areas where more research on finance would be particularly useful. In this section we present key research issues that obfuscate sense-making processes vis-à-vis the African infrastructure space. These issues include the incommensurability of data sets, transparency, territoriality and subnational data gaps, and issues related to understanding sustainable investment.

2.1 Issues of commensurability and interoperability

As discussed in the previous section, there are many different initiatives that seek to quantify and catalogue data on infrastructure investment in Africa. Table 3 indicates some of the main organizations that provide collated research on African investment.

Table 3: Major research databases on infrastructure financing in Africa

Initiative	Focus	Funded by	Based in	Database and methodology publicly available	Project specific data
ICA reports	Africa-wide, key investment trends by region, sector, and typology	AfDB	Abidjan, Cote d'Ivoire	Not accessible	No (only selected case studies)
PIDA progress reports/ PIDA dashboard	Africa-wide for projects funded under the PIDA programme	AU, AUDA, NEPAD, and AfDB	Addis Ababa, Ethiopia, Johannesburg, South Africa, and Abidjan, Côte d'Ivoire	Yes (but many items have undisclosed data)	Yes but undisclosed data for many projects
OECD-DAC development finance data (e.g., Aidflows)	Global; country and sector overviews; combines WB, AfDB, and OECD data	OECD countries	Paris, France	Yes	No
World Banks PPI (private participation in infrastructure) database	Public-private funded infrastructure projects	World Bank Group	Washington DC, US	Yes	Yes
CARI (China Africa Research Initiative) at Johns Hopkins School for Advanced Studies	Public-private funded infrastructure projects	World Bank Group	Washington DC, US	Yes	Yes
Infrastructure Journal (IJ Global)	Infrastructure project finance globally	Private	London, UK	Paywalled database	Due to paywall, author could not access to confirm level of granularity
Convergence reports	Blended finance globally	Private	Toronto, Canada, Nairobi, Kenya	Not available	No
Disrupt Africa reports and list of funded startups	Financial investments in ICT startups across six countries	Private	London, UK	Not available	No

SOURCE: Compiled by the authors. NB: This is not a comprehensive review

While supranational bodies like the African Development Bank, the World Bank, and the OECD Development Assistance Committee try to **harmonize and standardize reporting information** of their members, data remain scattered. This is because key bilateral partners (e.g., India and China) do not belong or report to these organizations, and because investment in infrastructure led by private enterprises is more difficult to chart and account for in official datasets (e.g., in the World Bank's PPI). Additionally, some institutions like the European Commission, did not share their data with the ICA, as there is no reporting obligation to Africa-based institutions (ICA, 2018). Some multilateral lenders like the Asian Infrastructure Investment Banks, which did report loans to African countries in 2017, are also missing from ICA data (this is unexplained in the documentation). Other funders with ODA are also missing, such as Australia and New Zealand, making it impossible to discern whether the aid budget of these countries to Africa is directly or indirectly involved in the funding of infrastructure.

The issue of data harmonization among research platforms and actors is exacerbated by differing **terminology related to financial tools**. One key example is concessional loans: despite the existence of the OECD-DAC standard, it only applies to countries that subscribe to DAC guidelines. That is, the terms of concessionality and the conditions attached to those terms can vary across loan-making institutions, making it impossible to frame concessional loans as a single category of financing tools. Another difficulty arises from the complexity of blended finance architectures. Therefore, within different datasets, the same financial component might be classified differently depending on how blended finance is defined, or whether or not the single element of a blended package can be isolated.

Relatedly, because of the **scattered and uncoordinated nature of research initiatives** currently addressing infrastructure investment in Africa, data standards are inconsistent, making information non-interoperable. Key examples of this issue include the ability to know whether reported funds are pledged funding or actual disbursement, how interests are determined in relation to the financial close of each project, whether Africa-wide data includes or does not include MENA countries, what is and is not included in the definition of each sector of investment, etc. Few research initiatives include caveats or footnotes explaining their research methodology and the criteria underlying their data. This issue hampers the possibility of generating additional knowledge from existing datasets by triangulating and comparing different sources to produce the finer-grained perspectives on the African infrastructure financing landscape that are needed.

2.2 Issues of transparency and autonomy

Beyond the consistency and interoperability of data, another problem facing Africa-based researchers addressing infrastructure financing and delivery is the different degrees of openness of the datasets upon which current reports and publications are based. While some research initiatives (such as CARI) and institutions (such as the World Bank) have open datasets that can be consulted online, the same cannot be said for most overview documents concerning African infrastructure finance. This issue stems from two related phenomena. First, the **lack of transparency** of many of the infrastructure deals happening on the continent. This problem applies to both single projects and to country-wide data. For example, most FDI and ODA flows to infrastructure funding in Africa remain unreported when coming from certain important players, like China and India. Second, and relatedly, datasets compiled by researchers often **rely on undisclosed or confidential information**. Not only does this lack of transparency create inequalities in access to informants and data, it also contributes to the impossibility of comparing different datasets.

In this regard, another crucial problem concerns the **autonomy and independence** of the research that currently takes place in the continent. With many of these initiatives spearheaded by the same institutions that also operate as funders, lenders, grant-makers, etc., or by institutions that are funded by third countries, or by academic projects based in Europe or North America, current data is disproportionately produced by actors who are also interested parties. While it is crucial that DFIs utilize their institutional capacities for research initiatives, those findings must be complemented by independent research, conducted by either universities, research centres, or civil society organizations based in Africa.

2.3 Issues of territorial mapping

The vast majority of investment data is captured and documented at the national scale. This is, of course, a reflection of the level of government at which most financial deal-making and lending takes place. Despite 30 years of decentralization reform seeking to devolve fiscal, political, and administrative powers to subnational territorial units (such as local or regional governments), most debt in Africa is taken on by national, not subnational, government. This is true even in the small handful of countries with federal systems, such as Ethiopia (OECD/UCLG, 2019). The majority of debt is thus held by the nation state, with key projects implemented by national line departments or their respective agencies (such as national utility companies or national road authorities).

While the debate about subnational borrowing (and the extent to which this should be ramped up or controlled) remains much contested, national-level data tells us little about where investments 'land' in African countries. The failure to collect finer-grained subnational data makes it difficult to ascertain, for example, if investments are rural or urban; coastal or inland; distributed or highly concentrated. National investment data equally fails to capture trans-territorial investment patterns. While national-level data provide some level of differentiation in terms of geographical spread across the continent, the nature of the investment and the extent to which this investment supports key processes such as urbanization or industrialization (discussed in more detail in Part 3) remain unclear. There is a need to better understand how projects land both spatially and institutionally, what kinds of spatial projects are being supported (corridors, urbanization, export economies, etc.), and which institutional

configurations are empowered. The latter is particularly needed, as key functions have been devolved to lower levels of governments, without devolving the requisite resources and financial competencies to deliver on these mandates. The question of whether infrastructure investment systems support the ongoing development of strong and capable institutional configurations will be critical for the long-term viability of these investments, the places they land, and the continent at large.

Part 3: Research Agenda

Reflecting on both the gaps in existing data on infrastructure finance and the pressing infrastructural needs on the African continent, we use this section to outline some key areas of the future research needed to improve how infrastructure investment in Africa is undertaken.

3.1 Capacitating African-based research centres to engage with infrastructure financing

A significant amount of knowledge on infrastructure generally, and financing infrastructure specifically, is produced either outside of Africa (for example in think tanks in the UK) or by research arms of Africa-based financial institutions (such as the World Bank). While understanding the continent's future is a global project requiring insights and knowledge consolidated from as many sources as possible, what continues to be missing from this knowledge project is a strong role and voice for African academic research centres and think tanks. While African universities could play a far more central role in knowledge production and agenda setting, traditional academic departments—with their heavy teaching loads, underfunding of strategic research, and siloed disciplinary structures—are not well-suited to ensuring that academics are positioned to meaningfully engage in key conversations. While these issues cannot be easily addressed by the international partners, a keen interest in the unique perspective of African scholars and thinkers, designated funding to support their time on projects and programmes, and shared development of outputs (such as reports, articles, programmes, etc.) would go some way in ensuring active participation.

Part of the challenge rests on the data side. In the African research context, there is a clear need for data collection, storage, and sharing systems that are more robust, accessible, and transparent. Equally, there is a serious need for meaning-making platforms and spaces (material, virtual, etc.) where this data can be translated into relevant insights that reflect local expertise and conceptual frames developed by and for the continent. At the intersection between data and meaning-making, there is the potential to fund innovative research programmes and projects that draw global and local expertise into productive conversation.

3.2 Non-OECD actors such as China, India, Turkey, Arab Gulf nations, etc.

Given the increasing importance of **new sources of development assistance, concessional finance, and FDI in the funding of infrastructure**, a related research agenda that understands investment modalities that escape clear-cut taxonomies (such as the OECD-DAC definitions of ODA, OOF, and FDI) is needed. First, it is vital to recognize that many of these actors—despite media hype—are not new. India, China, and Gulf states have long been development and commercial partners of several African nations, and they often operate in relation to those historical linkages (OECD - ACET, 2020). Second, the ability to conceive how the different “varieties of capital” operate (Lee, 2017) is a prerequisite to meaningfully analysing and understanding infrastructure financing; this means seeing beyond the patterns of traditional partners (e.g., the US and European countries). Third, the geopolitical calibre of platform initiatives such as the Belt and Road, which are territorializing Chinese surplus through infrastructure investment overseas, needs to be studied through a better understanding of both Chinese state-owned and private enterprises operating across the continent. To date, the research issues highlighted in Part 2 of this report have severely impaired capacity to grapple with infrastructure actors that have little to no reporting mandate with reference to frameworks such as the OECD-DAC.

3.3 Mapping continental transitions

As multi-generational, long-term projects, infrastructure investments require a view to the horizon. Today's investments must be attentive to the many and complex unfolding processes on the continent. There are some distinct certainties, and many uncertainties in the processes that are shaping—in uneven and diverse ways—the future of infrastructure in Africa. We have highlighted the following ‘transitions’ that we believe will be fundamental to shaping what sorts of infrastructure investment are both possible and desirable.

- **Urbanization:** Africa is the last continent to undergo urbanization and is currently urbanizing at a rapid rate; the continent's population is meant to double between 2020 and 2050, with more than two thirds of this growth taking place in cities (OECD/SWAC, 2020). Urbanization patterns in Africa are somewhat unique. Most African

countries have only one major city, which tends to be magnitudes larger in both population and geographical coverage than the country's secondary cities. Ninety-seven percent of urban areas are small, with less than 300,000 people (OECD/SWAC, 2020). These areas are experiencing rapid growth rates, albeit off very low bases (Roberts, 2014). The outsized primacy of Africa's capital cities, and the projected growth of smaller urban centres, have distinct implications for infrastructure investment into the future, forcing us to ask hard questions. For example, should investments seek to support growing mega-agglomerations, or entice populations to smaller centres? And, how can the agglomerative potential of cities yield higher all-around returns on infrastructure investments? Africa's urbanization also shores up questions of institutional control over urban infrastructure investments. For example, how can decentralization, urbanization, and metropolitanization go hand in hand to support development? What does this mean for the allocation of roles and functions to different levels of government?

- **Demographic transition:** A demographic transition resulting in a bulge in the youth population, particularly in urban areas, is underway. Almost 60% of Africa's population in 2019 is under the age of 25, making Africa the world's youngest continent. The youth bulge in African cities and the continent at large has many implications for urban development (Mo Ibrahim Foundation, 2019). To support this, Africa—and particularly African cities—requires long-term investment in urban areas to support the lifestyles and ambitions of the youth. Rather than fearing the so-called “youth bulge”, investors must take the needs, preferences, and capabilities of young people—the future users of long-term investments—seriously. For example, young people will need jobs in the future: can infrastructure investments today unlock these work opportunities? In what ways are young people tech savvy? What sorts of technological disruptions are likely to be possible for this generation?

- **Industrialization:** The need for semi- and low-skilled job creation in Africa is vital. To attend to both the need for economic growth and job creation, several African countries are developing new infrastructure projects in service of national and local industrial strategies. Special industrial zones linked to infrastructure development in urban areas, manufacturing zones along new transport corridors, and provisions for in-situ mineral processing facilities attached to new mining concessions, are a case in point of the revived interest in boosting Africa's manufacturing capacity. As of 2019, for example, there were estimated to be 189 operating special economic zones (SEZs) in Africa (many of which, in reality, function as export processing zones for foreign commodities which, in fact, create problems rather than help local industries). While the need for industry and work is well established, sustainable infrastructure's potential in terms of supporting industrialization remains unclear. For example, while the so-called 4th industrial revolution is heralded by the African Union as a “watershed moment” for greener industrial development in the continent (AU, 2020), there is also consistent flow FDI to the construction and mining-related industrial sectors. While it is clear that Africa cannot follow the same industrialization trajectory as Europe or even Asia, what this will look like and how to ensure sustainability remains to be determined.

- **Technological transformations (platform and AI):** As elsewhere, the “platformization” (Stehlin et al., 2020) or “platform pivot” (Barns, 2019) of many services—including logistics, urban mobility, media, financial systems, and so forth—driven by digital technologies is a fundamental trend. Digital platforms present both possibilities and risks for infrastructural governance. For example, one challenge stemming from platformization of infrastructure is that the owners of collective data produced by users are often private companies. Another challenge is that many platforms increasingly rely on AI technologies, and more specifically on various forms of machine learning, to improve their predictive algorithms. However, research on these protocols shows that predictive algorithms are not neutral, but replicate spatial and social inequalities (Whittaker et al., 2018; Benjamin, 2019). In addition to these data-related pitfalls, many other questions concerning issues of ownership and related digital rights are also critical, particularly given that investment in ICT, as shown earlier, is driven by private companies with equity stakes in the connectivity infrastructure.

- **The changing nature of work:** Linked to the digital turn, the future of work is also changing. Work is directly and indirectly linked to the job and labour market in countries and cities. Work is involved in every aspect of infrastructure—from writing contracts to actually building technical machines. From the delivery supply chains, to the ability to pay for services, the question of work is inseparable from the future of infrastructure. In Africa, as in the world at large, serious questions are being raised about what the future of work will look like as key infrastructure sectors (such as mining) shed jobs. Mechanization, digitization, and globalization are but some of the drivers of this job shedding and labour market restricting. These daunting processes must be read in relation to the other technological and economic disruptions that are resetting labour market dynamics in fundamental ways. The risks to economies and infrastructure if people across all skill levels cannot leverage infrastructure systems to create livelihoods, businesses, and wealth are numerous and real. There is a clear need to ensure that new infrastructure delivery models ensure “just transitions”, creating value and opportunities for economic empowerment across the full supply chain.

3.4 Transnational and geopolitical implications of infrastructure financing

Strengthening Africa's position in the global economy requires investments that transcend nation states and enhance the regional spatial potential of the continent. Key to this is engaging **transnational governance and geopolitics**. As infrastructure spans jurisdictions and has impacts far beyond the site of intervention, it becomes increasingly important to consider its spatial and political implications. The recent example of the Grand Ethiopian Renaissance Dam, potentially affecting downstream water supply to both Sudan and Egypt during the filling-up years, shows how important international co-operation and governance is to delivery of large-scale infrastructure. More generally, given that AU-based supranational initiatives such as PIDA (Programme for Infrastructure Development in Africa) and AfCFTA (African Continental Free Trade Area) currently rely on the idea of “integrated regional corridors” to achieve their goals of infrastructural and commercial integration (PIDA, 2020), it is vital to consider how national, regional, and local government are integrated into the design and realization of these transnational corridors—whether they are pipelines, electricity networks, railways, highways, or broadband. Regardless of scale, such corridors raise questions around both multilevel governance at the national level and geopolitical opportunity.

3.5 Beyond conventional service delivery

While mega-projects have their place, there is also a need for different sorts of infrastructure investment. First off, we need a better understanding of the **‘informal’ and hybrid services that currently exist**. Especially where significant infrastructure deficits prevail, people have often found ways of accessing energy, feeding their families, watching their favourite soap operas, staying dry during the rains, disposing of household and business waste. The strengths and weaknesses of these improvised infrastructure and service delivery systems are as important to understand as the classically engineered network systems that are designed to only serve a small proportion of the urban population. The investments made by households to secure ‘informal’ services and infrastructure offer clues to utilities and public financiers as to what end-users are willing to pay for. It is only once the respective logics driving both mega-infrastructure investment models and informal service provision are understood that they can be reconciled in effective “hybrid infrastructure systems”.

In addition to attending to infrastructural hybridity in terms of key services (e.g., water, energy, etc.), most infrastructure data collection and research reports (such as those outlined in Part I) cover only a small selection of infrastructure sectors. Generally, this includes the key utilities: water, energy, waste, and transportation (which is generally presented as essential to GDP growth and economic development). ICT has been recently added (and is positioned as a key input into attracting investment and spurring development). While these sectors are essential—there is no sense in undermining the importance of providing water and energy to residents and businesses alike—serious gaps in our infrastructure accounting remain. Many vital infrastructure, necessary for supporting everyday life, are excluded from these assessments, including education and health infrastructure, cultural and social infrastructure, and ecological services (e.g., natural systems).

Conclusion

This report is the starting point for a conversation. It asks more questions than it answers, pointing to the many gaps in our understanding and issues on the horizon that further complicate our outlook. What we can say from the overview and framing provided here is that there are several areas of future work that could greatly bolster our collective agenda and aims. These areas of work speak to the intersections between the need for the simultaneous empowerment of African-based institutions (such as local governments and universities), the mobilization of global finance in just and equitable ways, and the suturing and extending of fragmented and fractured infrastructure systems in African countries and cities. In terms of an agenda for research and action, we suggest two areas:

First, there are clear gaps in our **information, without which it is impossible to move forward**. These gaps are at the intersection between finance and infrastructure, hampering our ability to see either the system as it currently is or where it might be going. As a starting place, we need to address key gaps in the data collected on financial flows: how they are structured, where they land geographically, and what sorts of investments they fund. This is partially an issue of transparency and partially one of coordination. We also need to address gaps in our understanding of what sustainable infrastructure investment means for different infrastructure sectors. In order to clarify what sorts of investments we should be angling towards, it is necessary to have some idea about where the thinking in each sector is about what is sustainable. The sector papers that are currently being developed will work to attend to the latter—fleshing out an understanding of sustainability. However, the gaps in the data about financial flows require

a more coherent effort on the part of those whose flows are being documented, to improve and cohere reporting. In sum, the need for better data sharing is clear.

Second, and related to the issue of data sharing, is the question of **shared meaning-making and collective interplay**. There is a clear need for richer collaborations between actors involved in financing infrastructure in Africa. This collaboration requires coming together not only to share information, but also to collectively develop means of understanding opportunities and legacy constraints in new and different ways. The question of risk—how it is calculated and what its role is in shaping investment decisions—is central to the finance challenges at hand in Africa. As such, one of the focus areas of these collaborations may be to rethink and reframe risk. However, other themes might also serve as the basis of creating 'living laboratories' that allow for new knowledge to be created and ideas to be shared. That is, we need to further develop these ideas through collaborative processes and cutting-edge research that can be tested in the real world. It is only through on-the-ground experimentation with different sorts of infrastructure projects that we can develop the necessary proof-of-concept to align financial logics to sustainable urban development agendas. To push the sustainable agenda, we need bespoke innovation in infrastructure, which are 'unbankable' by the currently used metrics of financial viability. Through a portfolio of experiments, localized tests accompanied by detailed documentation could assist us in developing the necessary precedent to fuel change through incremental replicability and adaptability.

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