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Policy Brief

CLOSING THE FINANCING GAP FOR AFRICAN ENERGY INFRASTRUCTURE: TRENDS, CHALLENGES, AND OPPORTUNITIES

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Introduction[1]

Lack of energy access presents a formidable, but not insurmountable, challenge to African development. Energy poverty afflicts nearly 620 million people in Africa, limiting economic opportunities and creating health risks through the use of low-cost, alternative energy sources, such as wood fuel (IEA 2014). Without access to secure, reliable sources of electricity, households, businesses, schools, and hospitals cannot operate effectively, reducing quality of life and restricting human capital. As acknowledged in the global sustainable development agenda, addressing these energy needs is fundamental to achieving economic and human development objectives. African governments and their partners in the private sector and international development community have taken this to heart as can be seen by the growing policy attention and resources they are allocating to the continent's energy sector.

Financing to address Africa's energy infrastructure needs is estimated to have reached $8 billion in 2013 (APP 2015). Domestic public financing comprised nearly half of these investments while external financing—including private participation in infrastructure (PPI), official development finance (ODF), and Chinese investments—accounted for the rest. Still, the estimated cost of contending with Africa's energy infrastructure needs is staggering, amounting to approximately $63 billion in 2013 alone. This still leaves a financing gap of approximately $55 billion unresolved (APP 2015).

Yet, aggregate figures like these obscure understanding of which actors are financing energy infrastructure, how, and where across the continent. The following paper analyzes the trends, strengths, and weaknesses of various sources of energy infrastructure financing in Africa—including domestic public domestic investment, PPI, ODF, and Chinese financing. Furthermore, it contends that although lack of both capital and bankable projects poses a significant obstacle for expanding infrastructure financing in the continent, particularly for renewable energy projects, a solution involving a greater participation of development banks in the earlier stage of projects and leaving private funds to finance the less risky, latter stages of projects should be explored.

Trends in African energy infrastructure financing[2]

Financing sources for African energy infrastructure include domestic financing by African governments and external financing in the form of ODF from multilateral institutions (such as the African Development Bank and the World Bank, as well as most of the OECD-DAC donors), PPI, and Chinese financing.

[1] This policy brief was prepared by Amadou Sy and Amy Copley as background for the Africa Progress Panel's 2017 report, *Lights Power Action: Electrifying Africa.*

[2] Data on African energy infrastructure financing are not readily available and this section relies on a number of sources, including the Infrastructure Consortium for Africa (ICA), the International Monetary Fund (IMF), the International Energy Agency (IEA), and the Private Participation in Infrastructure Database (http://ppi.worldbank.org/); see Gutman, Sy, and Chattopadhyay (2015).

In terms of the breadth of its financing sources, the energy sector is comparable to the transportation sector in the sense that it relies on a combination of financing from governments, ODF, China, and PPI (see Table 1). Other sectors, such as the telecommunications (telecom) sector depend predominantly on a reduced number of financing sources—in this case, private sector investments. A closer look at the transportation sector suggests, however, that some subsectors rely on fewer financing options than others. This trend also appears to be the case in the energy sector where the private sector is mostly interested in the generation subsector, leaving investment in the transmission and distribution (T&D) subsectors to other financiers such as African governments and China.

Table 1: Sector versus infrastructure financing source matrix

Sector	Government	ODF	China	PPI
Energy	✓	✓	✓	✓
Telecom				✓
Transport	✓	✓	✓	✓
Water	✓	✓		

Transport Sector	Government	ODF	China	PPI
Seaports	✓			✓
Airports	✓	✓	✓	
Railroads	✓	✓	✓	
Roads	✓		✓	✓

Source: Gutman, Sy, and Chattopadhyay (2015).

Domestic finance

Domestic public investment (mostly through government budget allocation) constitutes the largest source of the continent's infrastructure financing, reaching $59.4 billion or 72.9 percent of the total African infrastructure financing in 2012 (IMF 2014). Encouragingly, African governments have, on average, increased their investments in infrastructure, and specifically in energy infrastructure, in recent years. As their infrastructure budgets grew by 8 percent per year from 2011-2013 so too did their allocations to the energy sector, which grew by 5 percent over the period, according to the Infrastructure Consortium for Africa (ICA 2014a).[3] Of total spending on infrastructure in 2011-2013, the energy sector received the second-highest budget allocation, at 37 percent of infrastructure budgets, following the transport sector at 41 percent (ICA 2014a).

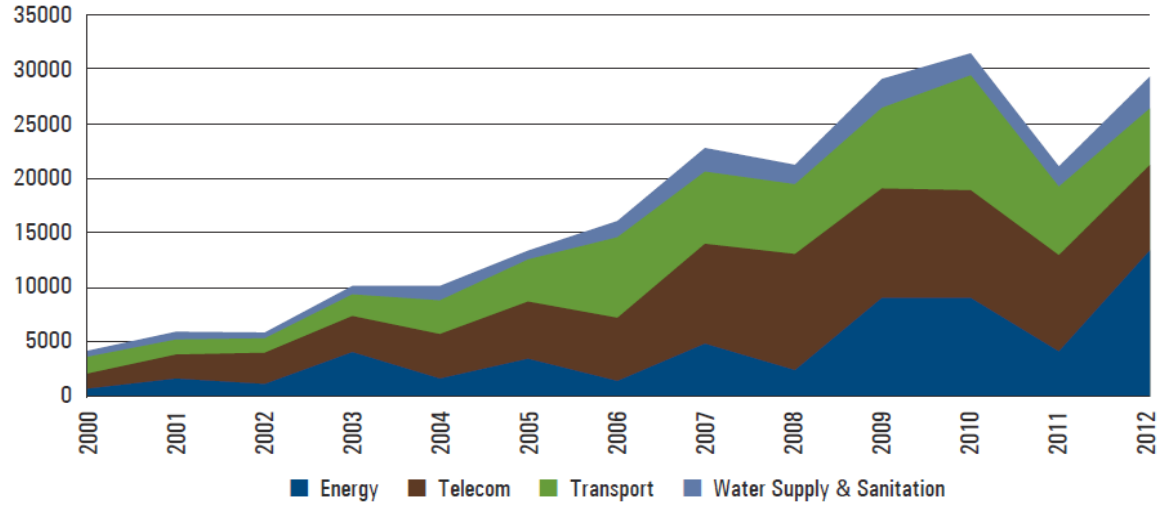
External finance

The three main sources of external financing for African infrastructure include ODF, PPI, and official Chinese financing, which account for 97 percent of all such external investments. Emerging markets—such as Brazil and India—as well as Arab states currently play a minor role in African infrastructure financing that they could expand upon in the future. Overall, external financing for infrastructure in sub-Saharan Africa across the three major external sources has tripled between 2004 and 2012 (see Figure 1). During this period, levels of ODF increased—especially from the World Bank and the African Development Bank (AfDB)—but, notably, the dominance of ODF in

[3] Another assessment by the IMF (2014b) of public infrastructure investment found that infrastructure budgets almost doubled from $28.5 billion in 2007 to 59.4 billion in 2012.

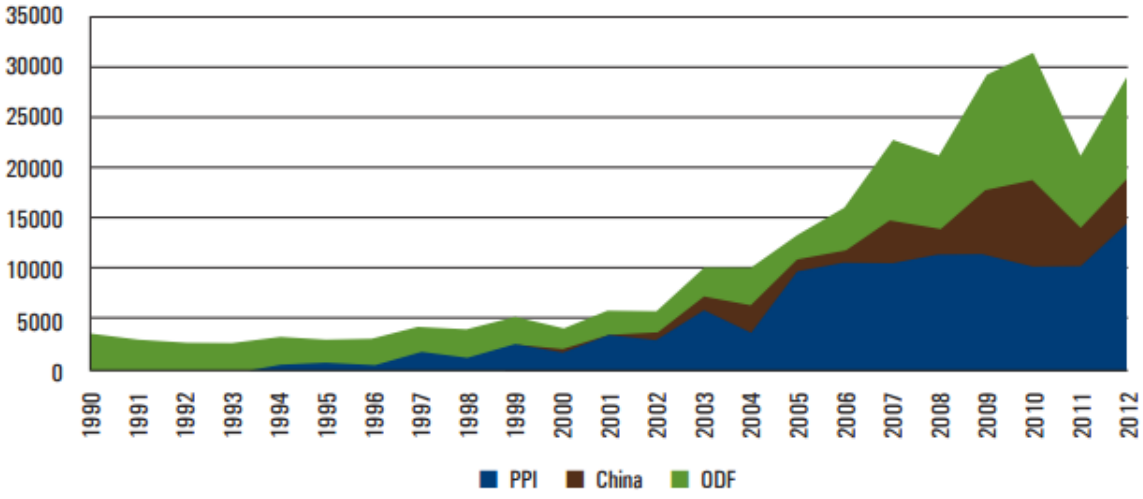
infrastructure financing declined as private investment surged to over 50 percent of external financing and China became a major bilateral source (Figure 2).

Figure 1: External financing: Energy expanding, telecom maturing (in USD millions, current)



Source: Gutman, Sy, and Chattopadhyay (2015).

Figure 2: Private sector grows in share of external financing (in USD millions, current)



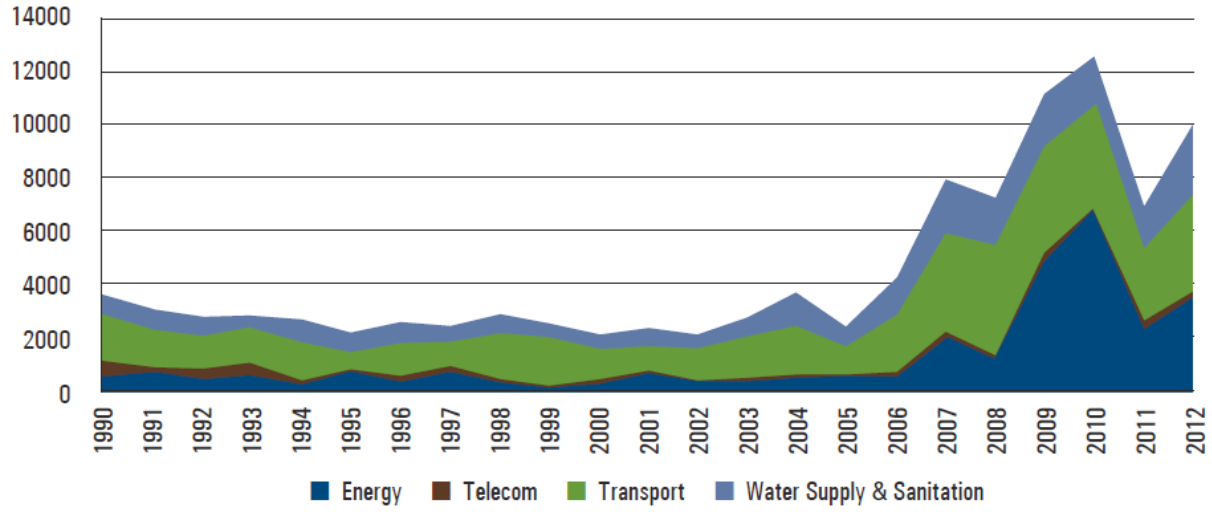
Source: Gutman, Sy, and Chattopadhyay (2015).

Official development finance

ODF served as the main source of external financing throughout the 1990s (see Figure 2). Since then, its share of external financing has declined slightly, representing nearly 35 percent of external financing to African infrastructure (as of the latest 2012 figure). Still, ODF continues to play an important role, especially in the sectors and countries that tend not to attract the same levels of investments from the private sector. While ODF's support has consistently focused on transport as well as water and sanitation projects, its investments in the energy sector have increased

substantially from $540 million annually in 2006 to $3.5 billion in 2012, representing nearly 35 percent of all ODF investments that year (see Figure 3). Even when financing for Eskom in South Africa is deducted, this increase remains consistent across the region.

Figure 3: ODF particularly relevant in energy (in USD millions, current)



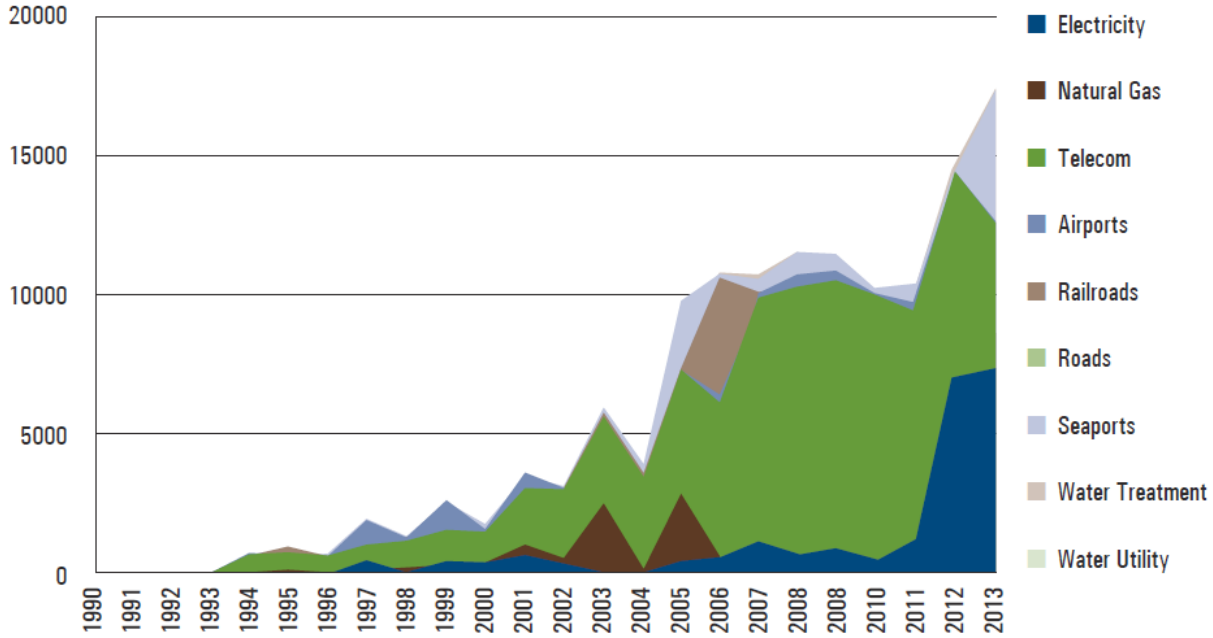
Source: Gutman, Sy, and Chattopadhyay (2015).

Private participation in infrastructure

PPI has served as the largest and most stable share of external financing for African infrastructure projects since 1999, constituting over 50 percent of all external investments. In contrast to ODF, its financing has concentrated on the lucrative telecom sector with almost two-thirds of total PPI in sub-Saharan Africa from 2005-2013 going to telecom (see Figure 4). The transport and energy sectors accounted for most of the remaining financing over the same period, and the electricity sub-sector alone made up 18.6 percent of PPI during this time. Growth in PPI to the energy sector is accelerating faster than other sectors, driven by investments in electricity; however, these investments largely target electricity generation rather than distribution, leaving distribution financing to alternative funding sources.

In 2015, sub-Saharan Africa closed on 23 infrastructure projects, amounting to $6.3 billion, with 18 of the 23 deals (accounting for $4 billion) in renewable energy. South Africa's REIPPP program drove the growth in energy sector investments (up from $2.6 billion in 2014) with 16 of the region's 23 projects.

Figure 4: PPI dominant in telecom (in USD millions, current)

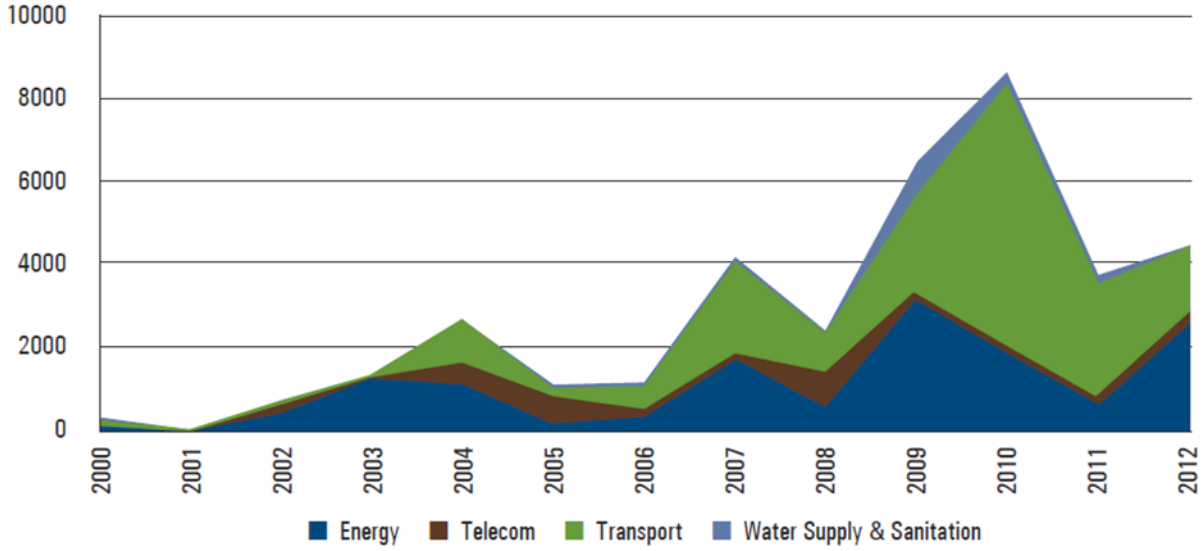


Source: Gutman, Sy, and Chattopadhyay (2015).

China

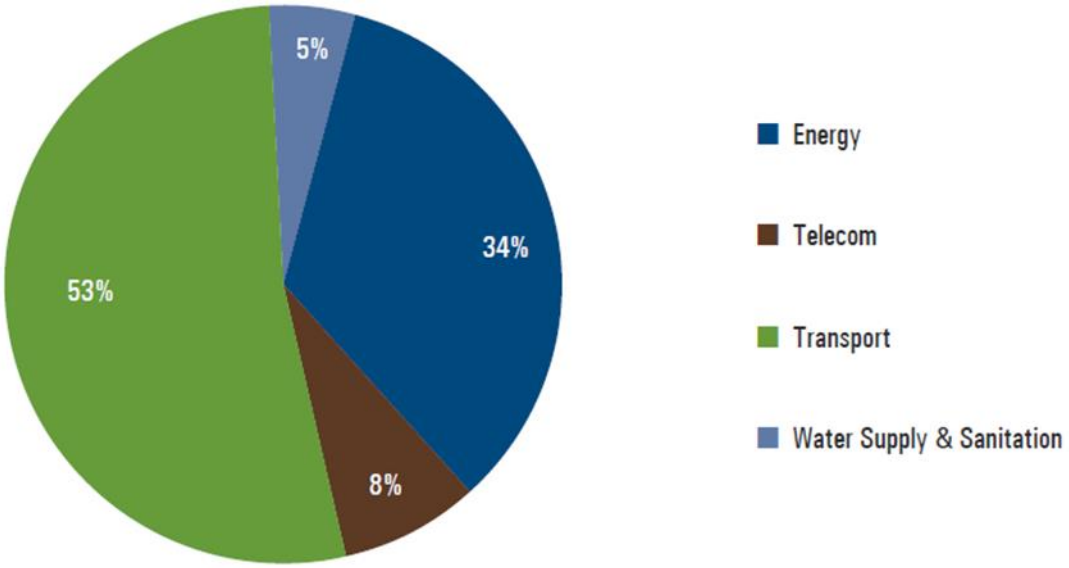
China's official financing has grown precipitously from less than $313 million in 2000 to $4.4 billion in 2012—nearly 20 percent of external financing for African infrastructure projects (see Figure 5). Its investments have primarily targeted the transport sector, especially railways and roads, in which it can compete for contracts through multilateral financing (see Figure 6). In recent years, its financing to the energy sector has increased to nearly half of all infrastructure investments, focusing mainly on hydropower projects. During the 2000s, China targeted its financing to mostly resource-rich countries; however, since 2010 it has interestingly broadened its focus to non-resource-rich countries that do not receive significant ODF or private sector investments, effectively complementing other external financing sources in the region. For example, currently the largest recipients of Chinese infrastructure financing are Ghana and Ethiopia, which do not have vast natural resource bases, and Cameroon and Zambia receive proportionately large amounts of Chinese infrastructure financing for being relatively small economies.

Figure 5: Chinese financing growing significantly (in USD millions, current)



Source: Gutman, Sy, and Chattopadhyay (2015).

Figure 6: Chinese financing strong in transport and energy (2005-2012)



Source: Gutman, Sy, and Chattopadhyay (2015).

A recent IEA (2016) report provides an overview of Chinese energy projects in sub-Saharan Africa. According to the IEA, Chinese companies operating as the main contractor were responsible for 30 percent of new capacity additions in sub-Saharan Africa from 2010 to 2015. The IEA (2016) further notes that during the same period, China financed about $13 billion or one-fifth of all investments in the region's power sector. Renewable energy solutions account for 56 percent of the total 17 gigawatts of generation capacity (equivalent to 10 percent of existing installed capacity in the region) planned for in 2010-2020 and hydropower accounts for 49 percent of the total.

The financing for these projects comes in the form of public lending from the Export-Import Bank of China (Exim Bank). Chinese support helped provide integrated solutions in power generation capacity and transmission and distribution (T&D), including cross-border transmission lines between Ethiopia and Kenya and local urban and rural distribution networks in Angola and Equatorial Guinea.

China's engagement in financing African infrastructure projects has elicited criticism, namely, for not consistently applying World Bank social and environmental safeguards and omitting considerations of institutional and operational importance. Yet, it is worth noting that China has also reached out to bilateral and multilateral donors regarding its role in founding the BRICS' New Development Bank and has partnered with the African Development Bank on the Africa Growing Together Fund—showing its willingness to collaborate with international donors and African partners.

Opportunities in renewable energy

Renewable, low-carbon technologies have the potential to rapidly expand energy access throughout the continent. Africa has a rich renewable energy asset base, especially in solar and wind power, and prices of low-carbon technologies are falling rapidly. However, a number of challenges within the sector and along the entire power value chain need to be addressed in order for a renewable revolution to occur.

First, on the demand side, low-income consumers often lack the initial capital to adopt off-grid renewable solutions despite the savings they would accrue over the course of its operation. Innovative business models, however, can prove useful in overcoming these barriers, as evidenced by the array of credit and payment options that many businesses now offer.[4]

On the supply side, the initial capital costs of setting up such large-scale renewable solutions are usually higher than the capital costs for carbon-intensive energy projects (and face their own financing challenges). Most countries cannot afford to use domestic public finance to support the establishment of large-scale renewable projects and also lack the appropriate enabling environment for promoting PPI in renewable energy solutions. For instance, PPI in the energy sector requires "predictable tariff regimes, simplified licensing procedures, standardized 'technology-based' power purchase agreements or realistic energy planning tools," which many countries still need to address, according to Antony Karembu, Policy and Public-Private Partnerships Advisor for the AfDB's Sustainable Energy Fund for Africa (SEFA). Creditworthiness of state utilities and aging grid networks also deter investors from supporting renewable energy generation projects.

In terms of prioritizing energy projects—grid or off-grid, renewable or carbon-intensive—the discussion is still ongoing, and the trade-offs are daunting.[5] Sustainable Energy for All (SE4ALL) estimates that to reach universal access globally, grid connection will need to be extended to all new urban connections and 30 percent of rural populations. The remaining 70 percent of rural populations would gain access through decentralized systems, with 65 percent accessing mini-grids

[4] For example, as discussed in the Africa Progress Panel 2015 report, the M-KOPA model in Kenya for solar off-grid systems allows households to pay a small deposit for the solar system and then pay back the remaining balance of the system on a pay-as-you-use basis, until the entire cost is covered.

[5] See: Alstone, Peter, Dimitry Gershenson, and Daniel M. Kammen, "Decentralized energy systems for clean electricity access," *Nature Climate Change,* March 25, 2015, and Nordhaus, Ted, Alex Trembath, Michael Shellenberger, Joyashree Roy, Roger Pielke, Jr., Daniel Sarewitz, Jason Lloyd, Mikael Roman, Kartikeya Singh, Lisa Margonelli, Mark Caine, Max Luke, and Todd Moss, *Our High-Energy Planet*, Oakland, CA and Washington, DC: The Breakthrough Institute and the Consortium for Science, Policy & Outcomes, Apr. 2014.

and 35 percent using solar home systems. However, a compelling case can be made for prioritizing expanding centralized grid electricity to promote large-scale and industrial economic enterprises. While decentralized low-carbon and off-grid technologies may be particularly suited to certain contexts, including those where they may augment agricultural productivity, support economic enterprises that provide higher incomes to more people, or complement grid systems, they cannot substitute for large-scale electricity generation and distribution, which will boost economic opportunities in non-farm, non-household sectors.

Financing challenges

Upon closer observation, it is clear that at the country level public investment in energy infrastructure varies widely, as each country selects its development priorities according to its national context (ICA 2014a). It is also evident that some countries have greater resources to allocate toward energy infrastructure based on the robustness of their domestic tax revenue mobilization efforts. For example, the ratio of tax revenues to GDP in 2013 ranged from 25 percent in South Africa (one of the highest among developing countries) to 2.8 percent in the Democratic Republic of the Congo.

Governments with smaller tax-to-GDP ratios need to boost their fiscal revenues in order to provide more resources to fill their infrastructure financing needs. Yet, increasing tax revenues alone may not be sufficient to augment spending on infrastructure, and spending reforms, which reduce earmarks on taxes and account for great allocations to infrastructure, may also be required. Policies to raise more fiscal revenues and spend it more efficiently must go hand in hand. The IMF (2015) estimates that about 40 percent of the potential value of public investment in low-income countries is lost to inefficiencies in the investment process due to time delays, cost overruns, and inadequate maintenance. Those inefficiencies are often the result of undertrained officials, inadequate processes for assessing needs, and preparing for and evaluating bids and corruption.

In addition, to complement tax revenues and diversify their sources of domestic financing, some countries are accessing international capital markets though international sovereign bond issuances. Eurobond issuances by sub-Saharan African countries peaked at $8.4 billion in 2014 and remained at $8.2 billion in 2015. However, the question of whether international sovereign bonds are reliable sources of infrastructure financing is being raised, especially as global financial conditions tighten, borrowing costs rise, investor interest dwindles, and oil prices fall, complicating efforts to service and refinance loans. Domestic capital markets could also expand their role in infrastructure financing although they are currently dominated in most countries by commercial banks that prioritize short-term financing. Other relatively untapped financing mechanisms include diaspora bonds and Islamic financial instruments (such as sukuk). A prudent and sustainable way to finance infrastructure would be to increase the participation of domestic institutional investors, which typically have a long-term horizon, such as local pension funds. This said, pension funds' objective to provide income security in old age should not be compromised by investing in infrastructure, and a strong governance structure is a precondition for such investments.

The strengths of ODF as a source of financing lie in its willingness to finance projects in higher risk situations. It is also more capable of engaging in sectors and projects that require additional institutional and policy expertise, such as transport (roads and railways), and water and sanitation projects, which PPI sources tend to engage in less. Conversely, critiques of ODF include the appropriateness of its binary, concessional/non-concessional lending for countries, rather than

offering a range of concessionality, as Chinese financing sources can do. Another challenge is optimizing ODF's evolving role relative to PPI, especially in the energy sector. For instance, ODF is increasingly being used to leverage PPI for energy projects. Continuing to innovate and maximize the potential of these partnerships will be crucial to fulfilling Africa's infrastructure financing gap. While China's involvement in the power sector in Africa is advancing at a robust pace, more transparency, including on the financing terms of these projects, would be welcome.

To continue the expansion of PPI beyond the telecom sector, certain challenges to African infrastructure financing must be addressed. According to a recent survey of private sector investors (ICA 2013), the biggest obstacles to investing in African infrastructure are: (i) project feasibility; (ii) country/political risk; (iii) profitability; and (iv) the legal/regulatory environment. Addressing these concerns will require a multi-stakeholder approaches. For instance, to increase project feasibility and profitability, relevant government ministries and other stakeholders, including regional economic communities, domestic and international financiers, technical specialists, and project preparation facilities, must engage in sufficient project preparation. However, often a lack of technical capacity and coordination is further undercut by limited funding. A number of initiatives already exist to further harmonize these efforts such as the Project Preparation Facilities Network (PPFN) launched in 2014 by the ICA (ICA 2014b). Innovative financing solutions—such as establishing infrastructure as an asset class—could also serve to encourage dedicated impact investors or crossover investors such as sovereign wealth funds. Furthermore, risk mitigation mechanisms such as the World Bank Group's IDA Partial Risk Guarantees (PRG), the International Financial Corporation's (IFC) Partial Credit Guarantees (PCG), the Multilateral Investment Guarantee Agency (MIGA), and the AfDB's Currency Exchange Fund (TCX) could expand their scope to help limit downside risks—of uncertain political climates and business environments—to potential investors.

The critical role of development banks[6]

A number of factors constrain African infrastructure projects, especially in the case of sustainable infrastructure. First, African countries face relatively high financing costs, reflecting investor's perceptions of the high risk involved in holding assets, particularly in infrastructure, in the continent. Infrastructure is considered risky since it is illiquid, long-term, and can be vulnerable to changes in countries' policy and regulatory environments. Sustainable infrastructure investment in renewables is even riskier since it may depend on subsidies or feed-in-tariffs to be economically feasible. All of these risk factors compound to make debt and equity for infrastructure projects in African countries more expensive than in developed countries.

Second, infrastructure projects have high upfront construction costs (even more so in the case of sustainable ones) so although operating costs may be lower over the project's lifetime, the initial capital costs could overwhelm the eventual gains from operations. African governments often cannot cover the upfront costs of construction, and private sector investors are deterred from investing in the project's early stages due to contractual or regulatory uncertainty. Risky and expensive developer equity is often the only private financing option in these cases. Addressing the cost of

[6] For more on the role that development banks can play in assisting with the riskier phases of infrastructure investments, see Arezki and Sy (2016).

financing for the initial phase of infrastructure projects is therefore crucial to enabling more private sector investment in these projects.

The financing challenges above and the scale of the investment needed are compounded in the case of regional projects.[7] One option that merits further exploration would be to scale-up the investment of development banks. Development banks, which have both the flexibility and expertise in infrastructure projects, should help finance riskier phases of large projects. Given the scale of infrastructure projects, development banks could attract co-financing from bilateral and multilateral partners as well as dedicated private investors. Once the construction phase is passed and cash flows are generated, development banks should disengage and offload their debts to pave the way for a viable engagement of long term-investors such as sovereign wealth funds and other long-term investors.

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[7] The Africa Power Vision (APV) undertaken with Power Africa; the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) model accompanying the Sustainable Energy for All (SE4ALL) Africa Hub efforts; and the Africa GreenCo solution bank in the context of the Programme for Infrastructure Development (PIDA).

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