

Building African Infrastructure with Chinese Money

Cosima Cassel
Giuseppe de Candia
Antonella Liberatore

June 22, 2010

Contents

1. Executive Summary.....	3
2. Africa's infrastructure gap	4
2.1. Scarcity	4
2.2. Unreliability.....	5
2.3. High consumer fees	5
2.4. Potential GDP growth.....	6
2.5. Closing the gap	7
3. Filling the gap: funding options.....	8
3.1. Public financing of infrastructure	8
3.2. Public-private partnerships	9
3.3. OECD Official Development Assistance	10
3.4. Non-OECD sources	11
4. Chinese funding for African Infrastructure	12
4.1. China's growing involvement in African infrastructure.....	12
4.2. "Resources for Infrastructure" deals.....	13
4.3. Case study: Angola.....	15
4.4. Risks	17
5. Recommendations and Conclusion	19
6. References	22

1. Executive Summary

Africa¹ faces a number of challenges on its quest for development, and a key factor in the impediment of economic growth is the lack of quality infrastructure; it is notably lacking in paved roads and power. The existing infrastructure is often expensive, unreliable or in disrepair. Such limitations close many regions off from the global economy, in cases reducing firm productivity by up to 40%, and sustaining the poverty which is so prevalent on the world's poorest continent. AICD predicts that \$93 billion is needed to sufficiently fill the infrastructure gap, with 63% of that going to energy and transportation; however, current spending falls far short of that figure – it currently stands at around \$45 billion. After efficiency savings, the infrastructure gap could be filled with an extra \$31 billion worth of funds.

The additional financing needed to close Africa's infrastructure gap is unlikely to come from the three traditional funding sources. The bulk of current spending on infrastructure comes from public sector sources, but these are already under strain. Official ODA from OECD countries tends to ignore energy needs, and although it provides significant funds for transportation projects, it is far from fully meeting needs. Private funding is almost entirely focused on the more profitable telecom sector. Therefore, African countries are increasingly turning to non-traditional financiers to meet their needs.

China is the biggest provider of non-traditional finance. A particularly interesting form of Chinese financing in Africa are 'resource for infrastructure' or R4I deals. These consist of Chinese loans to fund infrastructure construction in Africa, and are paid back with natural resources as extracted from the recipient African country. China is growing rapidly and needs these resources to feed its ever-expanding manufacturing industry; whilst Africa is in desperate need of additional funding for its infrastructure, and lacks the capital to fully reap the benefits of its natural resource endowments. Hence the economic complementarities between China and Africa can be exploited to the mutual benefit of both parties involved.

A number of risks associated with such deals have been identified, such as debt sustainability, environmental damage, 'Dutch disease' and the resource curse. This memo acknowledges these, yet finds significant evidence that such risks do not outweigh the potential benefits for an African country of engaging in such deals. Hence it is recommended for African countries to pursue R4I deals with China.

After carefully scrutinizing Sino-African R4I deals, this memo provides a number of recommendations for African policy makers and contract designers to bear in mind when agreeing terms. Clauses relating to use of local labour and inputs, technology and knowledge transfer, pursuit of joint ventures and elimination of signature bonuses (which encourage corruption) are all recommended for inclusion in contracts.

The structure of this paper is as follows: Section 2 discusses in further detail the nature of Africa's infrastructure gap. Section 3 addresses possible methods of funding this gap, and introduces the idea of non-traditional financiers as a possible solution to the problem. Section 4 investigates in further detail the nature of Chinese involvement in the region, and introduces the idea of resource for infrastructure deals. Section 5 poses some recommendations when designing the contract and concludes.

¹ By Africa, this document means Sub-Saharan Africa.

2. Africa's infrastructure gap

Africa's inadequate infrastructure is holding back the continent's development because it is scarce, unreliable, of low quality, and expensive for consumers². Africa lags behind other regions of the world in almost every sector of infrastructure development, but the largest gaps are in power and transportation. For example, compared to the world's second poorest region, South Asia, Africa has one half the electricity generation capacity and one third the paved road density. The problem of scarcity is compounded by the high cost and unreliability of the infrastructure. For example, firms in Africa on average experience power outages 56 days per year, resulting in GDP losses that range from 1 to 5% depending on the country.

These factors have a large negative impact on the region's economic performance, resulting in a 40% firm productivity loss, and an unmeasured loss in terms of human capital and quality of life. A recent study by Calderón (2008) showed that from 1995 to 2005, infrastructure investments alone contributed one percentage point to GDP growth; also, growth would be two percentage points higher if Africa as a whole had infrastructure levels similar to Mauritius, the regional leader. Based on the assumption that African needs to achieve a 7% yearly GDP growth to significantly reduce poverty, the World Bank has estimated that the region will need to spend \$93 billion per year over the next decade.³

2.1. Scarcity

Africa is severely behind the rest of the world in terms of infrastructure stocks. Apart from a small lead on South Asia in mobile phone adoption and internet access, Africa trails the rest of the developing world in every infrastructure sector. Table 2.1 illustrates Africa's infrastructure deficit in paved roads, fixed and mobile phone lines, power generation capacity and electricity coverage. The deficit is especially critical in power generation and roads, infrastructure that impacts the cost and feasibility of doing business. Africa has less than one half the generation capacity (per person) and electricity coverage of South Asia, and less than one third that of East Asia. Sub-Saharan Africa's (SSA) 48 countries and 800 million people cumulatively consume as much electricity as all of Spain's 45 million people.

Road density is lower in Africa than other developing regions: 152 km of roads per 1000 square km of land area, and only one third of it is paved. Deep-sea ports are currently connected to remote internal regions by 10,000 km of road, but between 60,000 and 100,000 km of road are required to achieve an intra-regional trunk network. Road density is especially low in rural Africa: only one third of rural residents live within 2km of an all-season road. This is unfortunate because access to good roads is a pre-condition for giving rural residents access to urban services and markets that would allow them to abandon subsistence agriculture and increase productivity.

Although subscribership is still modest, Africa's adoption of mobile telephony has been successful and is similar to that seen elsewhere. Between 1999 and 2006, mobile phone subscriptions grew by 100 million, and 50% of the population found itself within range of a mobile signal (Minges et al. 2008) with very positive consequences for economic growth.

Infrastructure is poor due to chronic under-investment: Africa had levels of infrastructure stocks comparable to South and East Asia in the 1960s and 1970s, but has spent less than those regions for the last three decades. On average African countries spend around 6% of their GDP on infrastructure annually; in contrast, China and some other Southeast Asian countries have sustained infrastructure spending at 15% of GDP for periods of over a decade. When income levels are taken into account, Africa still lags other regions; this

² This section draws largely on the AICD's 2010 report "Africa's Infrastructure: A Time for Transformation". Any non-attributed facts in this section are taken from this report.

³ Africa's average GDP growth in the 2000s was approximately 5%.

underlines the point that low infrastructure stocks are a result of low investment, not lower income. Similarly, resource-rich African countries also substantially lag their peers in terms of infrastructure, showing that natural resource wealth has not resulted in better infrastructure for Africa.

Table 2.1: African infrastructure lags other developing regions

Indicator	Sub-Saharan Africa	South Asia	East Asia and Pacific	Latin America and Caribbean
Paved road density (km/ 1000 square km, 2001)	49	149	59	418
Total road density (km/ 1000 square km, 2001)	152	306	237	740
Fixed-line density (subscribers/ 1000 people, 2004)	33	39	90	197
Mobile density (subscribers/ 1000 people, 2004)	101	86	208	350
Internet density (subscribers/ 100 people, 2004)	2.8	1.7	6.6	14.1
Generation capacity (MW/million people, 2003)	70	154	231	464
Electricity coverage(% of households, 2004)	18	44	57	79

Source: Yepes et al. 2008

2.2. Unreliability

Africa's existing infrastructure stock is in a state of disrepair. This is the result both of insufficient funding for maintenance and inefficient bureaucracy and management. For example, where power is available its benefits are severely reduced by widespread shortages. A study by the World Bank found that African manufacturing firms experience outages 56 days per year (Eberhard et al. 2008). Shortages require expensive emergency power generation or the suspension of work. That same study found that African countries lose between 1 and 6% of potential GDP yearly due to power outages. For example, Malawi was estimated to lose over 6% of GDP yearly, South Africa and Uganda more than 5%, and Tanzania more than 4%.

Unreliable and slow transportation unduly stifles the flow of goods: neglected road and rail networks combine with red tape to reduce effective freight speeds between major urban areas to under 10 km/hr. In this case, although the infrastructure is in dire need of maintenance, upgrading and expansion, a major source of delays (and hence cost to businesses) is bureaucracy. This makes the point that in order to be effective infrastructure investments must be made in conjunction with structural and policy improvements. The state of rail transportation is considerably worse than that of roads. Some of the infrastructure is 100 years old; parts of the track need repair or replacement; signalling still relies on manual systems. All this explains the extremely slow speeds of rail traffic.

2.3. High consumer fees

African consumers pay higher prices for infrastructure services than consumers in other developing countries and the rest of the world. Table 2.2 compares the range of infrastructure usage charges in Africa to charges in other developing regions. At the high end of the price ranges, users in some African countries pay three to ten times more for the same service compared to users elsewhere. These high prices increase the cost of doing business in Africa and reduce demand by households. This reduces economic growth directly by reducing business volume and indirectly by slowing investment in human capital.

Prices are inflated due to high supplier costs and lack of competition. For example, electricity prices can be four times higher in African countries that rely on inefficient diesel generation. Road freight tariffs can be four times higher in Africa due to a lack of competition that results in profit margins over 60%. In the case of internet access, the high price is due to both high supplier costs (for countries that do not own submarine cable) and lack of competition (for countries where service is provided by a state monopoly). Table 2.2 shows that internet access can cost Africans more than ten times what users pay elsewhere. That the world's poorest region pays the highest prices for internet access threatens both Africa's international business development and the very principles of free information flow and information equality.

Table 2.2: Consumer prices are higher in Africa than other developing regions

Indicator	SSA	Other regions
Power tariffs (\$⁴/kWh)	0.02-0.46	0.05-0.10
Water tariffs (\$/cubic meter)	0.86-6.56	0.03-0.60
Road freight tariffs (\$/ton-km)	0.04-0.14	0.01-0.04
Mobile telephony (\$/month)	2.6-21.0	9.9
International telephony (\$/3 min. call to US)	0.44-12.5	2.0
Internet dial-up service (\$/month)	6.7-148.0	11.0

Source: AICD 2010

Note: Ranges reflect prices in different countries and various consumption levels. Prices for telephony and Internet represent all developing regions, including Africa.

Africa's high power charges are due to a recent combination of supply shocks due to droughts, oil price increases, conflicts, and increased demand due to economic growth. This situation has persisted because the continent has failed to harness its substantial hydroelectric power potential: currently, Africa exploits only 10% of this potential. Nor has Africa managed to create regional markets for power which would enable economies of scale and allow the region to overcome its fragmentation to make larger investments in power.

2.4. Potential GDP growth

Infrastructure contributes to economic growth by enabling business and human development. At the same time, through higher demand, economic growth drives investment in infrastructure. Despite this reverse-causality problem, recent studies have managed to isolate and measure infrastructure's impact on economic growth. A representative study (Calderón 2008) estimated that between 1995 and 2005 infrastructure contributed slightly over 1 percentage point to GDP growth. This is higher than the 0.8 point contribution by macroeconomic and structural adjustments. The same study estimates that the region's GDP growth would be 1 to 2 percentage points higher if African infrastructure were at the level of Mauritius, the regional leader. The largest contributions would come from increasing ICT, electricity-generating capacity, road network length and road quality.

Another study based on investment climate surveys (Escribano et al. 2008) found that inadequate infrastructure in Africa reduces firm productivity by 40%. Poor infrastructure hurts some countries more than crime, red tape, corruption and lack of financing – factors that are blamed much more often than infrastructure for the region's poverty.

⁴ All \$ signify US \$ unless stated

There are numerous documented links between infrastructure and productivity: better access to electricity reduces the cost of doing business; access to safe water nearby avoids lengthy trips to fetch water; better transportation increases the movement of goods, thereby creating jobs and boosting incomes; ICT networks allow critical market information to reach remote populations.

There are also numerous documented links between infrastructure and human development: safe water access improves health, increases adult productivity, and lowers child mortality; electricity increases literacy and school completion rates; improved transportation allows the intensification of agriculture and the use of urban services by rural populations; telecommunication access reduces spending on transportation.

2.5. Closing the gap

Africa needs to achieve a 7% annual rate of GDP growth in order to reduce poverty to the extent set by the Millennium Development Goals. This can only be achieved if Africa's infrastructure is upgraded and extended. Based on two independent estimates of the region's requirements for the coming decade (by the Commission for Africa and the Africa Infrastructure Country Diagnostic), Africa needs to spend an additional \$30 billion per year on infrastructure. The AICD's estimate is based on the following investment plan to reach adequate infrastructure levels in the medium term:

- Add 7MW of new power generation capacity per year to keep up with rising demand.
- Lay 22,000 MW of cross-border transmission lines for power trading.
- Complete a fibre optic backbone network and continental submarine cable loop.
- Interconnect major urban centres, ports, and border crossings with good roads.
- Provide all-season road access to agricultural land to foster intensification.
- Double the irrigated land area.
- Meet the MDGs for water and sanitation.
- Raise power coverage by 10 percentage points.

According to the AICD these investments and the maintenance of the current infrastructure stock will require \$93 billion per annum, equivalent to 15% of African GDP. The \$30 billion estimate is arrived at by subtracting current spending (\$45 billion) and potential efficiency gains (\$17 billion) Of the total spending, one third is for operations and maintenance, and two thirds for capital expenditure (upgrades and new infrastructure). Table 2.3 shows the sector breakdown of required infrastructure spending. Power accounts for almost half the costs, reflecting the fact that this is where Africa lags other regions the most based on capacity, coverage and consumption. Water and Sanitation Services and Transportation each account for approximately one fifth of the total cost. Half the transportation costs are for O&M because much of the spending is for repairs. WSS costs have a larger share of new investment because these networks need massive extensions to meet the last decade's large increase in urban populations.

Table 2.3: Overall Infrastructure Spending Needs for Sub-Saharan Africa (\$ billions annually)

Infrastructure sector	Capital expenditure	Operation and maintenance	Total spending
ICT	7.0	2.0	9.0
Irrigation	2.9	0.6	3.4
Power	26.7	14.1	40.8
Transport	8.8	9.4	18.2
WSS	14.9	7.0	21.9
Total	60.4	33.0	93.3

Source: AICD 2010

Note: ICT = information and communication technology

3. Filling the gap: funding options

Africa needs to spend \$93 billion per year over the next decade in order to significantly reduce poverty. Half of this amount should be allocated to power and one fifth each to transportation and WSS. Total current spending amounts to \$45 billion a year. After accounting for \$17 billion in efficiency savings, the remaining funding gap is \$31 billion per year. This section explains why this gap is unlikely to be filled by traditional funding sources and that China is a promising new financier for infrastructure.

The bulk of current spending, nearly \$30 billion per year, comes from public sources; however, only one third of this finances new projects, while the remaining \$20 billion go to operation and maintenance of the existing infrastructure stock. Private sector involvement (usually in the form of Public-Private Partnerships) has been growing a lot in recent years, but is almost entirely allocated to the telecom sector. Official Development Assistance accounts for a considerable part of total investment in infrastructure, but it is not expected to grow fast enough to meet investment needs. Traditional financing sources are thus unlikely to expand their investment, especially in the sectors where Africa lags the most.

New important actors, namely China, India and some Arab states, are emerging as important financiers of infrastructure. Their annual commitments have been growing at a staggering rate since the early 2000's, reaching a peak of \$8 billion in 2006. These non-traditional financiers seem to favour production-enhancing projects in resource rich countries. By heavily investing in the power sector, they are contributing to reducing Africa's largest gap.

China is by far the largest actor among the non-OECD financiers and its involvement is set to grow significantly in the coming years. Chinese funding is likely to make a considerable contribution toward Africa's needs, especially in the sectors where the gap is largest.

3.1. Public financing of infrastructure

The public sector is the greatest source of financing for African infrastructure. In most African countries, domestic public sector resources, which include tax revenues and user fees charged by state-owned enterprises, contribute to more than a half of total infrastructure spending.

Public spending includes both new investment, aimed at increasing the infrastructure stock, and spending in operation and maintenance (O&M) of existing stock. As shown in table 3.1, Africa's average total government expenditure is about 5% of GDP, of which less than two percentage points are for new investment. Almost two thirds of total annual public spending, in fact, goes to O&M; this leaves only about \$10 billion for the construction of new infrastructure, or about \$300 million a year for the average country. This amount falls far short of what the average SSA country requires.

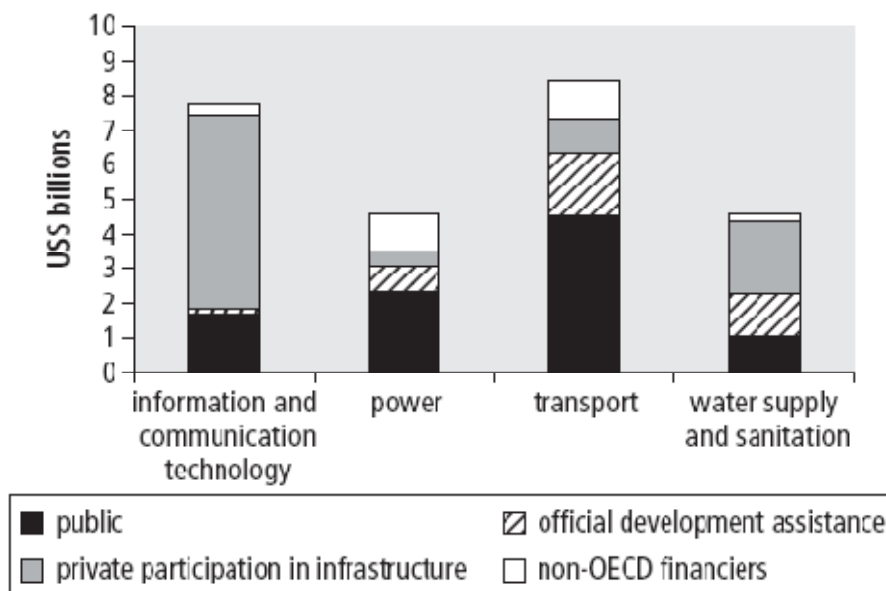
Table 3.1: Fiscal flows in Africa allocated to infrastructure

	Absolute value (\$ billions)	% of GDP
Investment	10	2
O&M	23	3
Total	33	5

Source: AICD database 2005

Figure 3.1 shows the breakdown of infrastructure investment by sector and source. Public funds are the largest source of investment financing for transportation and power, the sectors facing the greatest need. While this shows that African governments direct their spending where it is needed most, it also reflects the fact that these sectors face underinvestment because public budgets are too limited.

Figure 3.1: Sources of Financing for Infrastructure (Investment) by Sector



Source: AICD 2010

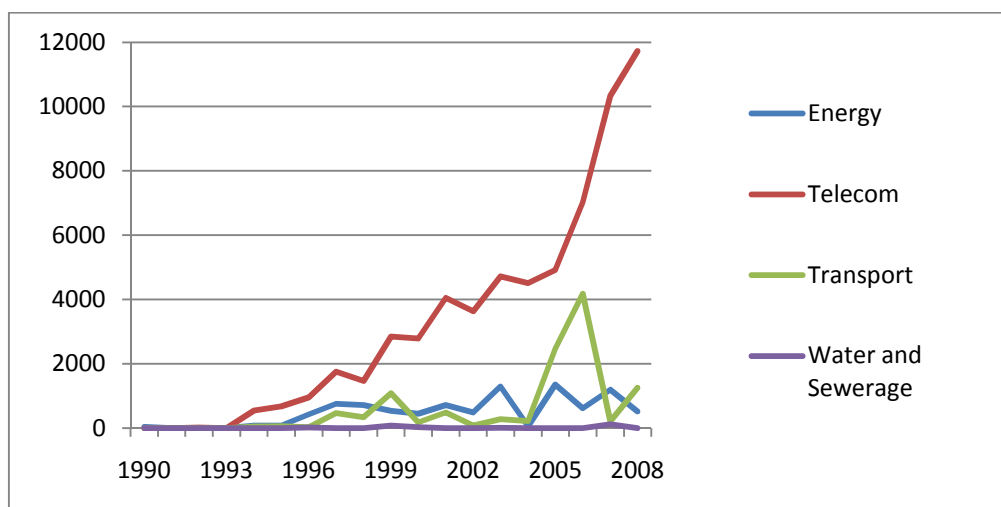
These figures show that African governments are making valiant efforts; nevertheless, the comparison with recent experiences of Asian countries reveals how meagre this figure is. In 2006 China spent about 15 percent of its GDP on new investments alone. The observed trends in government spending, moreover, do not suggest much prospects of increasing allocations from the public budget, given the narrow tax base of these countries and their limited ability to borrow.

3.2. Public-private partnerships

During the 1990's and early 2000's, public-private partnerships have been the largest source of external financing for African infrastructure. This is mostly due to the policies implemented by African governments (and donors) through 1970s and 1980s, aimed at engaging the private sector in the development and management of their infrastructure. However, the expected amounts of private flows have not fully materialized and private sector participation has remained limited to some total 10 to 15% of new infrastructure financing (Kauffmann 2008). Moreover, private involvement is remarkably lower in Africa than in the rest of the developing world, reaching an average of one half of what it is in South Asia and only one sixth of South America (Private participation in infrastructure database, World Bank).

The telecom sector, which enjoys higher profitability, attracts the bulk of private investments (75%), while water is by far the sector that private investors neglect most (see figure 3.2). Among the often-cited causes of limited private participation are the lack of stable long-term finance, the presence of high sector-specific risks and, of course, the risks arising from political instability and poor governance (Kandiero 2009). For those reasons, private sources are not deemed a realistic solution to filling the gap, especially for sectors such as power and transportation, where the gap is largest.

Figure 3.2: Private Investment in Projects by Sector (\$ millions)

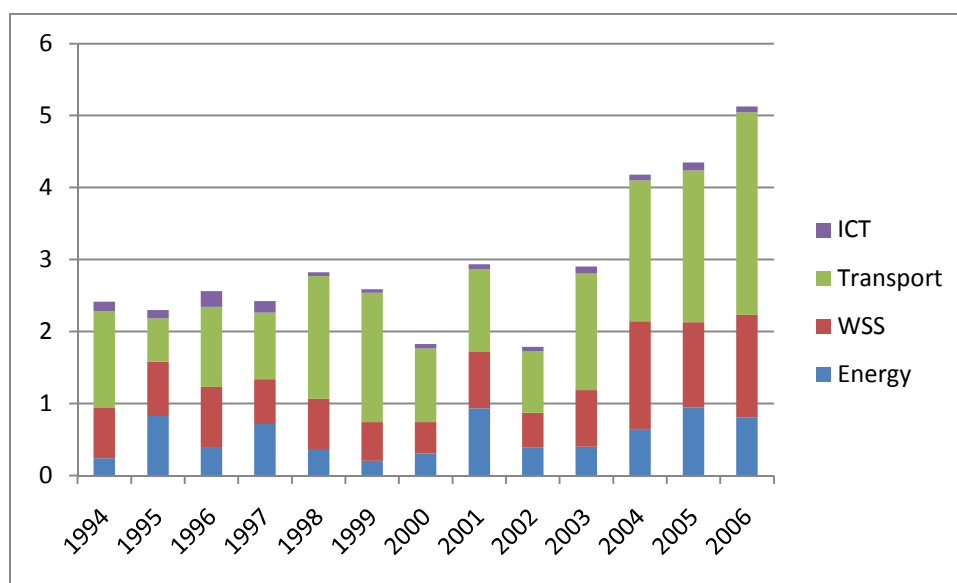


Source: PPIAF database

3.3. OECD Official Development Assistance

Africa has historically received significant Official Development Assistance (ODA) as a major source of infrastructure funding. Nevertheless, despite the ever-growing amounts of money that developed countries devote to aid, infrastructure financing has lost its central position in recent years, while the West has been rethinking its aid program, moving from focus on infrastructure and capacity building towards projects supporting rural development and poverty reduction (Brautigam 2010). Figure 3.3 shows the sectoral allocation of aid: water, sanitation and transport receive a major proportion of total ODA, while ICT is understandably neglected. The amount going to power is clearly insufficient to cover requirements. The current levels of aid remain very low compared to the capital flows that have been recommended, and are not expected to increase in the near future (ICA 2008).

Figure 3.3: ODA Financing of Infrastructure (\$ billions)

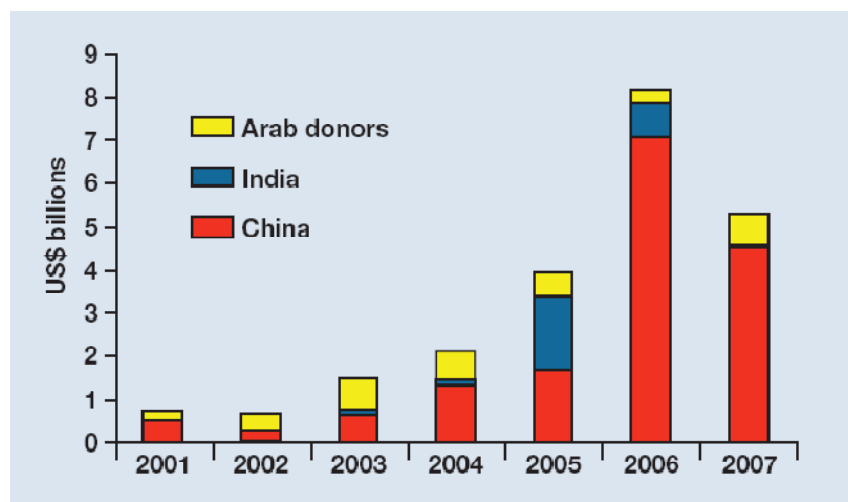


Sources: ICA annual report 2006 and 2008

3.4. Non-OECD sources

Following a reverse trend with respect to developed economies, in recent years some non-OECD countries have begun to play an important role in financing infrastructure in SSA. Among the “emerging financiers”, China, India and the Arab Countries hold a leading position. Their commitment to infrastructure financing has been growing at a staggering rate since the early 2000’s: starting from less than \$1 billion a year in 2001, they reached a peak of nearly \$8 billion in 2006. The magnitude of this expenditure, comparable or even higher than the reported ODA flows, is enough to make a substantial contribution towards the reduction of Africa’s infrastructure gap (see figure 3.4).

Figure 3.4 Annual commitments to infrastructure projects in Sub-Saharan Africa, 2001–07



Source: Foster 2008

Funds deriving from non-OECD financiers often go towards large-scale infrastructure projects, mostly (but not only) in resource rich countries (Foster 2008). This regional pattern is certainly linked to China and India’s acknowledged “thirst” for natural resources, but it is also part of a broad strategy of South-South cooperation aimed at achieving mutual economic benefit. This strategy is also reflected by the infrastructure sectors that receive most non-OECD funds: as shown in figure 3.1, the largest part of this new financing goes to production-enhancing infrastructure, such as power and transportation, helping to fill the major gaps in African infrastructure.

The relevance of the red bars in figure 3.4 is self-evident: China, among the non-traditional financiers, is by far the biggest in size, and concurrently shows the highest growth rates: average annual commitments for infrastructure increased from \$0.5 billion in 2001–2003, to \$7 billion in 2006⁵ and \$4.5 billion in 2007. Although complete information is not available, China has continued to make substantial infrastructure commitments in 2008 and 2009⁶.

These flows are large enough to make a considerable contribution toward Africa’s needs. Their impact on Africa’s infrastructure deficit is potentially enormous, especially in those sectors where the gap is bigger.

⁵ 2006 is known as China’s “year of Africa”.

⁶ To mention just a few: \$6 billion to the DRC in 2008; \$2.3 billion to Mozambique in 2009; \$1 billion to Zambia in 2010.

4. Chinese funding for African Infrastructure

The size and availability of Chinese funds means such involvement provides a great opportunity for Africa to finance its infrastructure gap, particularly in the traditionally neglected areas of power and transport. The “resources for infrastructure” (R4I) deals, in particular, are the optimal way to exploit the economic complementarities that exist between Africa and China. These deals involve loans from China to finance African infrastructure projects, and repayments are made in terms of natural resources. Africa is a continent rich in oil, metals and minerals, and China’s burgeoning manufacturing industry demands such resources at a rapidly increasing rate. Furthermore China has a construction sector at the frontier of global competitiveness.

Successful examples of such deals have been witnessed in a number of SSA countries; for example Angola, one African partner in such a deal with China. Angola managed to leverage its oil resources to reconstruct its infrastructure following its civil war. In addition it received investment in other areas of the economy (such as schools, hospitals and local business). Together, these played a role in increasing trade and GDP growth dramatically.

Concerns over issues such as debt sustainability, environmental damage and ‘Dutch disease’ have been raised. However, R4I deals present less of a concern than traditional financing for debt sustainability and Dutch disease. Environmental damage is more of a concern, but there is much that African countries can do to mitigate this risk.

African countries can mitigate the risks associated with these issues. Africa can reap benefits from R4I, and obtain the much-needed production enhancing infrastructure.

4.1. China’s growing involvement in African infrastructure

China is by far the most promising source of funds for African infrastructure. In addition to the aforementioned \$15 billion cumulative commitments of the period 2001-2007, Chinese authorities committed to an \$8.5 billion deal with DRC in 2008⁷, and there is evidence of deals with several other African countries in 2009 and 2010. Trends suggest that Chinese funding towards Africa will continue to grow rapidly.

Power and transport sectors receive the largest shares of infrastructure finance from China, followed by telecommunications and, with a much smaller share, water. This distribution by sector reflects the aforementioned pattern of non-traditional financiers, concentrating on infrastructure linked to natural resource development and, more generally, to productive activities.

Chinese capital flows to infrastructure are part of a broader economic cooperation between Africa and China, involving strategic integration of trade, foreign direct investment (FDI), and aid. Bilateral trade, in fact, increased from around \$10 billion in 2000 to \$106.8 billion in 2008, while Chinese foreign FDI into Africa grew from an average of \$107 million per annum in the latter half of the 1990s to an average of \$326 million during the period 2003-2006⁸.

The Forum on China-Africa Cooperation (FOCAC), established in 2000, is the key institutional framework for Sino-African collaboration on trade and investment policy, and for the participation of Chinese companies in infrastructural works in Africa. China has claimed that this relationship is based on equality, mutual benefit and non-interference, which is appreciated by African governments, who often find Western involvement too paternalistic. Both FOCAC and the observed trends in funding flows suggest that China has

⁷ The deal was downsized to \$6 billion after some pressures by the IMF.

⁸ Chinese FDI in Africa still accounts for around 1 percent of total stock in the continent; the registered growth rate in the last few years, though, is remarkable.

a centralized, long-term strategy for Africa, which is based on the consideration of a number of evident economic complementarities that exist between the two parties and create substantial potential gains from cooperation.

Firstly, there is Africa's huge infrastructure deficit as has been mentioned repeatedly in this report. China, on the other hand, has developed one of the world's largest and most competitive construction industries. Since 1999, Chinese firms have been winning a significant share (20 percent) of African infrastructure contracts awarded by the International Development Association, and they tend to capture the largest contracts⁹. Chinese firms are particularly competitive in the area of civil works, where they account for 31 percent of total contract value over the period of 2004–06. (Foster et al, 2008).

Secondly, China has become the world's biggest workshop, generating an increasing demand for oil and minerals. Despite being among the major oil producers (with a 4.8% share of world production), China can only provide for less than half of its domestic oil needs. China is also dependent on imports of most base metals, including iron ore, lead and zinc. Chinese demand has been growing at a rate over 10% a year since 1990 (increasingly more in recent years), and is the major driver behind the soaring prices of metals in the international market.

Africa is tremendously resource rich. It possesses significant oil and mineral reserves whose potential has not as yet been fully realized, at least partly due to infrastructure bottlenecks. Africa produces more than 60 metal and mineral products, and its proven reserves of major base metals (copper, iron, lead and zinc) make up 30% of the world total. Africa also holds close to 10% of the world's proven oil reserves, but has substantial unproven oil reserves (Goldstein et al. 2006).

The presence of such economic complementarities suggests that there is a large convergence of interests, and strong possibilities for mutual gains. For these reasons the Sino-African economic cooperation is likely to be sustainable.

4.2. "Resources for Infrastructure" deals

Chinese infrastructure funding may take several different forms, which include commercial and concessional loans, investment, credit lines and grants. Among them, however, the trading of infrastructure for resources is particularly relevant in this context

A loan is negotiated to finance an infrastructure project, and repayment of the loan is made in terms of natural resources (e.g. oil). This funding agreement has proven an effective and fast way to build African infrastructure. China, given the economic complementarities cited above, and its willingness to sign this kind of deals, is the ideal business partner for African countries with resource endowments.

These barter agreements are not new, however; this type arrangement has been used since the beginning of the century. Moreover, China itself has used resource-backed loans to foster its own development¹⁰.

Several deals reflecting this structure have been signed in different African countries since the early 2000's. Table 4.1 summarizes those signed up to 2007. Such deals total around 15 per cent of the total Chinese involvement in the region. Their potential to enhance growth in Africa is considerable.

⁹The average contract value is about US\$6 million in the case of the African Development Bank and US\$11 million in the case of the International Development Association (World Bank), compared to more typical contract values of US\$3–4 million.(Foster et al. 2008).

¹⁰ In the 1970's and 80's China leveraged its natural resources (oil and coal) to attract a \$10 billion loan from Japan, which was used to get new infrastructure built by Japanese firms (transport corridors, coal mines, power grids). (Brautigam 2010).

Table 4.1: Chinese-financed infrastructure projects backed by natural resources, 2001-2007

Country	Year of commitment	Status at the end of 2007	Natural resource to be received in payment	Project description	Total Chinese financing (\$ millions)
Congo, Rep.	2001	Under construction	Oil	Congo River Dam. Backed by crude oil guarantees.	280
Sudan	2001	Completed	Oil	Construction of the El-Gaili (Al Jaily) Power Plant, first two phases with Sudan's oil serving as collateral for the loans.	128
Angola	2004	Completed	Oil	Oil-backed loan to repair damaged infrastructure bombed in the country's civil war (power, transport, ICT, and water portion). China to receive 10,000 barrels of oil per day.	1020
Nigeria	2005	Under construction	Oil	Construction of gas turbine power plant at Papalanto. PetroChina secured by a deal to purchase 30,000 barrels of crude oil a day from the Nigerian National Petroleum Corporation (NNPC) for a period of one year, renewable.	298
Guinea	2006	Agreement	Bauxite	Souapiti Dam project. Reportedly linked to mining (Bauxite) revenues.	1000
Gabon	2006	Agreement	Iron	Bélinga iron ore reserve. Loan is to be repaid via sales of iron ore to China.	Not available
Zimbabwe	2006	Agreement, possibly not materialized	Chromium	Construction of new coal mines and three thermal power stations in Dande, the Zambezi valley on the Zambian border. In exchange, Zimbabwe was to provide China with chromium.	Not available
Ghana	2007	Under construction	Cocoa	Bui Dam hydro-power project. Part of the loan will be repaid in cocoa exports to China.	562
Total					3287

Source: Foster et al. 2008

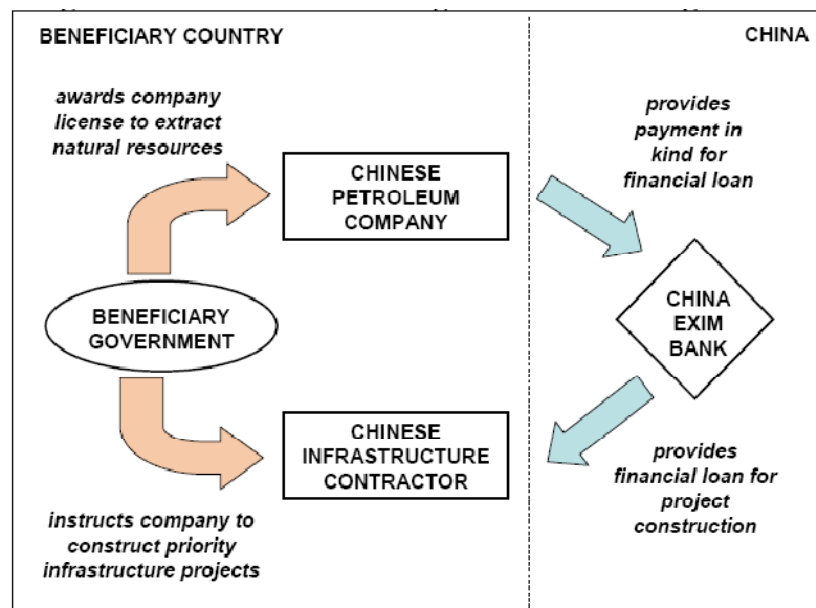
Sino-African deals of this kind require an intergovernmental framework agreement which establishes the purpose, amount, maturity and interest rate of the loan. A loan agreement, in most cases partially concessional, is then signed between the borrower government and China Ex-Im¹¹ Bank. The interest rate varies from 1.25% to 3%, there may be a short grace period, repayment is over 10–20 years, and Renminbi is the debt currency (Reisen 2007).

The deals also require that a share of the projects (80-60%) is subcontracted to Chinese companies, chosen by Chinese authorities and approved by the African government. The capital is disbursed in successive tranches, released against project completion and directly paid to Chinese companies in China via the Ex-Im Bank. This is a key distinguishing feature of these deals, as the financing works as a credit line and funds are never transferred to host governments (see Figure 4.1). Then, in exchange for infrastructure provision, the borrowing government will give the right to mine natural resources through acquisition of equity stakes in a

¹¹ Ex-Im Bank stands for Export-Import Bank.

national oil company or through acquiring licenses for production for Chinese natural resource companies (mostly oil or minerals).

Figure 4.1: Structure of Chinese deals



Source: Foster et al. 2008

The exact financial terms of these deals are particularly difficult to pinpoint and vary case by case; nevertheless, some analyses underline that these packages are favourable for African countries because they are easier and faster in delivery than traditional aid, with less conditions attached. Therefore, this sort of financial arrangement can be effectively used by countries without creditor credentials, but with natural resources to back up their loans. (Alden and Alves 2009).

4.3. Case study: Angola

To further understand this new form of Chinese involvement in Africa, the empirical case of Angola is worth studying in more detail. In fact, the success of the Sino-Angolan case has led to these types of resource for infrastructure deals being coined “The Angola Mode”.

Following a 28-year civil war, Angola was left with infrastructure in severe disrepair, and with limited funds to begin reconstruction. China offered loans of billions of dollars financing for infrastructure projects, to be distributed at the concessional rate of Libor +1.5, with a grace period of three years to be repaid with 10,000 barrels of oil per day¹². Chinese firms received a number of the project contracts, with loans transferred from China’s Ex-Im Bank. Funds were released in phases, totalling \$2.5 billion. Table 4.2 provides figures and sectors to which the initial disbursements were directed. A further \$2 billion (not shown in the table), was subsequently allocated to additional projects, with heavy focus on the highway, railway, energy and water sectors. The overall total of \$4.75 billion valued almost 5% of Angola’s 2007 GDP¹³.

The Angola deal is distinctive due to its coordinated nature. The majority of funds were directed towards infrastructure projects, such as the \$211 million rehabilitation of 371 kilometers of road between Luanda and Uíge¹⁴. But investment also targeted social projects, such as schools and hospitals, and additionally

¹² Foster et al 2008: 4

¹³ Angolan GDP was \$101.6 billion (2007 est.) according to CIA World Country Factbook

¹⁴ Campos and Vines 2008: 6

stimulated local economy. Through the \$267m investment in fisheries, employment is expected to be created for 20,000 people directly, and 100,000 indirectly.

Table 4.2: Projects Financed by Ex-Im Bank of China

Sector	Total Value (\$)
Health	409 319 197
Education	592 449 983
Energy and Water	465 197 725
Agriculture	203 760 172
Transport	13 840 468
Social Communication	66 905 200
Public Works	366 674 100
Fisheries	306 847 509
Post and Telecommunications	332 643 689
Total	2 759 298 460

Source: Campos et al. 2008

It is true that China is not the only player in Angolan infrastructure investment. Although aggregate data is unavailable, there exists evidence of other sources of funding; a \$1.1 billion deal was agreed with the IMF in 2009, and Canada has contributed a similar figure¹⁵. These figures are significant, but fall short of China's pledges.

Angola's economy has been growing at rates of over 10% since 2005 (CIA Factbook 2010), with GDP per capita increasing from \$794 (2002) to \$1492 (2008)¹⁶. It is impossible to measure how much of that growth is due directly and indirectly to the China deal, and it is clear that high oil prices of the 2000s, alongside booming Angolan oil production are the significant contributor to this growth.

But the Chinese resource for infrastructure deal is likely to have made a significant impact on Angolan infrastructure rehabilitation countrywide, as shown by the number and variety of projects in the country. Sino-Angolan trade has also increased dramatically (in fact, in 2008 Angola become China's biggest supplier of oil, according to the Beijing customs administration¹⁷).

However, there has been criticism that Chinese involvement is merely to secure oil out of self-interest. One of the original Chinese-funded infrastructure projects was the rehabilitation of the Beguela railway, facilitating Chinese entry into Angola's oil patch¹⁸. Although such criticisms may be credible in regards to some projects, such claims are unlikely to apply to the majority. Evidence suggests significant Chinese

¹⁵ <http://www.journalofcommerce.com/article/id30904/concrete>

¹⁶ <http://data.un.org>

¹⁷ <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aqJ3Wjxs.OWs>

¹⁸ Downs 2007

funded projects included water and energy networks set up to serve newly-built institutes and schools, along with new telecommunication lines, and water treatment plants¹⁹.

Such deals may also have mitigated the threat of corruption. The Angolan public sector is infamous for corruption, and the probability of embezzlement of oil revenues destined for infrastructure projects would surely have been much higher with management left solely to Angolan officials. Furthermore, disregarding the possibility of corruption, if left to Angola, the organisation of such projects is likely to be inferior to China's approach; as mentioned earlier, China has considerable construction expertise.

4.4. Risks

Chinese resources-for-infrastructure loans have an important role to play in Africa's economic growth. But this approach to financing infrastructure presents some risks. The major areas of concern regarding Chinese R4I loans are environmental damage, debt sustainability, corruption and loss of competitiveness in manufacturing²⁰. In this section we argue that although these are serious concerns, African countries already have the tools to mitigate these risks.

Environmental damage

China has a poor environmental track record both at home and abroad. This, combined with Africa's weak environmental standards, justifies the concern that Chinese-led extractive and infrastructure projects may do irreversible environmental damage. Western companies generally follow international environmental guidelines; but equivalent standards are yet to be adopted by China, making Chinese involvement more threatening in this respect. Recent regulations imposed within China's borders have failed to stop damage, and observers worry that China's worst polluters will be the first to enter Africa, in order to avoid increased domestic regulation (Bosshard 2008). In Africa, Sudan's Merowe dam is one example of an environmentally dangerous project led by the Chinese. A company involved with the project performed the initial assessment and cleared the project with minor provisions, but the Sudanese Ministry of Environment was never allowed to review the assessment. In 2006, an independent review concluded that the project was "far from meeting European or international standards."²¹

However, there is evidence that China is becoming more serious about environmental concerns. In 2007, China's Ex-Im Bank published its environmental policy (adopted in 2004); possibly due to feedback from NGOs, the bank published more detailed guidelines in 2008. Although these standards are not as good as Western ones, they allow international and local NGOs to call China to task on projects that negatively impact the environment and well-being of nearby residents. Ex-Im Bank recently suspended a project to build a hydropower dam in a Gabonese national park after Brainforest, a Gabonese environmental NGO, wrote to the bank arguing that that the project violated its environmental guidelines²².

Environmental damage can be moderated if civil society and NGOs take a proactive role in monitoring projects. As long as Africa stands firm and makes it clear that it will not compromise on its ecology, China seems willing to listen. But African governments often have an incentive ex-post to ignore the environmental impact of large projects, so they should do more to commit to environmental responsibility ex-ante. This could be achieved by specifying an environmental standard in the resources-for-infrastructure loan contract.

¹⁹ Campos et al 2008

²⁰ We consider risks from the perspective of an African policy maker. For example, we ignore concerns like those voiced by the international community regarding China's involvement with autocratic regimes in Sudan and Zimbabwe.

²¹ EAWAG, Independent Review of the Environmental Impact Assessment for the Merowe Dam Project (Nile River, Sudan), March 15, 2006, pp. 5, 76.

²² <http://www.internationalrivers.org/en/blog/peter-bosshard/china-not-rogue-dam-builder-we-feared-it-would-be>

Debt sustainability

The fast growth of Chinese loans to Africa has raised concerns about African debt burdens, because excessive levels of debt distort incentives and reduce public investment. In particular, OECD donors have worried about Chinese lending to African countries that have received Western debt-relief. However, a study by the OECD (Reisen and Ndoye 2008) empirically evaluated the sustainability of Chinese loans. The study considered debt build-up, as well as GDP growth, exports, and governance standards. It concluded that some African countries borrowing from China actually show significant improvement in terms of debt sustainability. The big push China gives to an African country's exports and GDP growth compensate for the larger debt burden.

Furthermore, resources-for-infrastructure loans are a more sustainable form of debt than traditional loans for two reasons. First, because the loans are repaid with resources from specific resource extraction projects, the means of repayment are committed ex-ante; governments come up with the means to repay traditional debt in a more ad-hoc fashion. Second, the burden of debt-service can also be reduced by negotiating for the interest payments to be made with resources from the same extraction projects. Finally, to further strengthen the sustainability of resources-for-infrastructure loans, African governments can insist on a contract term to specify that in the event of lower-than-expected resource extraction, the loans will still not be serviced with budgetary funds. This was the case for the DRC's 2008 deal with China.

Dutch disease and the resource curse

Dutch disease refers to negative effect resource extraction can have on the manufacturing sector. Natural resource exports cause the exchange rate to appreciate; this lowers the manufacturing sector's international competitiveness and can lead to firm closures and higher unemployment; in turn, this directs more capital and labour to the resource extraction sector, creating a negative cycle. Resource curse refers to the corruption, lack of transparency, and poor governance that seem to plague resource-rich developing countries. Resource revenues may weaken democracies because they strengthen autocratic regimes, and delay or prevent the transition to democracy (Keenan 2008).

Resources-for-infrastructure loans may actually reduce the risk of Dutch disease. Owen Barder (2006) considers whether ODA causes Dutch disease and argues that if used to improve the supply side (by investing in infrastructure, education, or health) ODA can raise national productivity and offset the loss of competitiveness due to exchange rate appreciation. This argument applies equally to resources-for-infrastructure deals since they commit resource revenues to infrastructure projects. Improving Africa's poor infrastructure will increase efficiency and cost savings and therefore international competitiveness.

With regard to **corruption and governance issues**: Chinese resources-for-infrastructure loans are preferable to traditional funding because they reduce opportunities for embezzlement. The funds are held in Chinese banks and disbursed directly to construction firms when work is completed. Corruption and poor incentives could be further reduced by eliminating signature bonuses for this type of contract. The rationale for signature bonuses is weak in the case of resources-for-infrastructure loans because these loans allow countries to quickly gain infrastructure and hence benefit from as-yet-unrealized extraction projects.

There are positive signs with regard to governance concerns more generally: the Extractive Industries Transparency Initiative²³ (EITI) has been adopted by many resource-rich African countries; China has shown more openness to the EITI; and China has adopted the Equator Principles²⁴ at home (Alden and Alves 2009).

²³ EITI is a standard that requires extraction companies to publish what they pay, and governments what they receive.

²⁴ The principles are a voluntary set of standards based on World Bank and International Finance Corporation policies.

5. Recommendations and Conclusion

Africa's infrastructure gap, estimated at \$30 billion per year, is holding back the continent's development, and costing almost two percentage points of GDP growth per year. Financing trends over the last decade indicate that in the near and medium term the traditional sources of funding (i.e. government budgets, private investors and OECD donors) will not be available at the scale required for Africa to achieve and sustain the 7% yearly growth level needed to significantly reduce poverty within ten years.

Since 2003, China has been injecting large capital flows into Africa, and its commitments to infrastructure projects have recently reached \$8 billion annually. China's large capital reserves, its need for natural resources, and its expertise in the construction sector indicate that this funding trend will continue. African countries would do well to pursue Chinese funding. More specifically, countries with untapped resources would benefit the most from resources-for-infrastructure deals with China. These deals have shown they can deliver infrastructure quickly and cheaply, without increasing the burden of debt service and with lower loss from corruption than traditional funding. Tying resource revenues to infrastructure in this way has two additional benefits: it helps other industries by improving productivity and therefore countering the effects of Dutch disease; and it provides a commitment mechanism to funding infrastructure projects.

Apart from the direct benefits of increasing infrastructure stocks, the net benefit of these deals will depend on the details of the terms of their contracts. African countries considering these deals should carefully plan for a number of other issues related to their risks and secondary benefits. In particular, these deals are an opportunity for significant levels of short-term job creation, skills transfer, capacity expansion, and supply chain development. On the other hand, these deals also present risks of environmental damage and larger stocks of neglected infrastructure. Below, we discuss our recommendations for maximizing the benefits and reducing the risks of resources-for-infrastructure deals.

Use and train local labour

Infrastructure projects stimulate the economy by creating jobs directly and indirectly. African countries should try to keep as much of that stimulus at home as possible by requiring a large proportion of local labour. In Angola's case the contract required a 30% proportion of local labour; instead, over the last five years, local labour has turned out to be 40% (CCS 2010). A shift to local labour tends to happen as Chinese workers become relatively more expensive, language and cultural barriers break down, and Chinese management becomes better acquainted with the skills of local workers.

The increase in the use of local labour should not be left to chance. It should be required and financially incentivized by the contract. African countries should push for higher proportions of local labour from the start of the project implementation. There is a trade-off between the use of local labour and the speed of completion, so the optimal proportion of local labour will vary by country and depend on the availability of skilled workers. Mozambique may be an extreme example: in 2008 the Ministry of Public Works and Housing started requiring all companies to employ 10 local workers for each foreign worker hired.

Training programs can help achieve higher proportions of local labour without affecting project schedules or quality. These programs should be offered for both workers and managers, should be formally included in the contract terms, and should help in achieving the targeted schedule and proportion for local labour. In 2008 Angola started a housing project that is funded and run by the Chinese; the project employs four thousand local workers, all of whom attended a four-week training program before joining.

Purchase inputs locally

Local procurement of construction materials like cement or equipment has the dual benefit of increasing local business and indirectly creating jobs. Unfortunately, Angola has not benefited much from its resources-for-infrastructure in this regard. Chinese construction companies operating in Angola import all inputs from China, even simple ones like pins and bolts (CCS 2010). To some extent this is justified by the lower cost,

higher quality, and greater volume of Chinese inputs compared to African inputs. However, cost, quality, and volume can be addressed by introducing supply chain management programs. Chinese firms leading construction projects should be contractually required to work with local suppliers in exchange for commitments by the latter to systematically cut costs and improve quality (Kaplinsky 2008). This would increase local capacity, deepen supply chains, and diversify the economy. Finally, when negotiating terms of resources-for-infrastructure deals, governments should think regionally, not just locally: when inputs cannot be sourced locally, preference should be given to sourcing inputs in neighbouring countries where economic stimulus is more likely to have a knock-on effect for the infrastructure recipient.

Specify environmental standards

Explicit environmental standards empower civil society and NGOs to more effectively monitor projects and advocate compliance. The absence of explicit standards sends a signal that environmental concerns are secondary and that there will not be transparency regarding environmental impact. As explained above, China has recently published environmental guidelines for its African projects, and these have already been used by NGOs to halt non-compliant projects. African governments can increase their and China's commitment to environmental responsibility by contractually specifying environmental standards in the resources-for-infrastructure loan contracts.

Use joint ventures for resource extraction

Resources-for-infrastructure deals require the African country to grant a mining concession to the firm handling the resource extraction. Rather than granting the concession to a Chinese firm (usually a state-owned enterprise), governments should grant it to a joint-venture between a domestic firm and the Chinese firm. Extraction projects by joint ventures results in better profit-sharing terms, increase technology and management skills transfer, and contribute to institutional maturity for the African country. In Angola, the company responsible for the oil extraction projects is a joint venture between the state oil company, Sonangol and China's state oil company, Sinopec.

Eliminate signature bonuses

The rationale behind signature bonuses is that they allow a country to start reaping the benefits of resource development early on, without waiting for what may be a long extraction project with uncertain returns. Signature bonuses don't make sense in the case of resources-for-infrastructure loans: the infrastructure projects begin mere months after the deals are finalized, and the economy can soon benefit from the new or rehabilitated infrastructure.

Since resources-for-infrastructure loans reduce the benefits of signature bonuses, these are outweighed by their inherent risks. Signature bonuses distort the incentives of public officials negotiating foreign contracts. First, officials are more likely to consider them "windfall gains" and therefore more likely to embezzle them; second, a public official with a short time horizon is likely to prefer signature bonuses to royalties or other contract terms, and may therefore trade off royalties for the signature bonus (Keenan 2008). Finally, signature bonuses are more prone to embezzlement than Chinese loans because they are managed directly by the local government, while the loans are held and managed by China as explained above.

Plan for infrastructure sustainability

Existing African infrastructure is often neglected because O&M budgets are stretched thin and are unlikely to increase. A country that signs a resources-for-infrastructure deal with China risks finding itself with even more infrastructure it cannot maintain. Lack of funds and management and technical skills may result in neglect of brand new or recently upgraded infrastructure. Public officials responsible for selecting projects should resist the temptation to focus on "shiny new projects" and plan for long-term sustainability of their infrastructure endowment. The solution is to contractually commit some portion of the loans to: long-term O&M; finding and training local infrastructure managers; and hiring private firms to manage new

infrastructure. A particularly promising approach is to use public-private partnerships to operate new infrastructure. This is consistent with recent best practice for infrastructure provision in countries that have attempted liberalization: lead initial construction with public spending but favour private investment in O&M to import commercial discipline (UNCTAD 2009).

Conclusion

In this memo we have shown that Africa is in dire need of infrastructure improvements and new investments, especially in transportation and energy. If Africa can spend \$30 billion more than its current level annually for the next decade, it can achieve and sustain the 7% GDP growth it needs to escape extreme poverty. We have argued this additional infrastructure financing is unlikely to come from traditional sources: government budgets are stretched thin; official development aid is not targeted at transportation and energy, the sectors in most need; private financing overwhelmingly goes to ICT. China, India and the Arab states are Africa's newest and fastest growing financiers and offer the best hope for additional massive infrastructure investments.

China stands out by far among the new financiers for the quantity of funds it has committed to Africa and for its aggressive and ambitious partnership with Africa. China recently surpassed the OECD in annual infrastructure funding for Africa, and this trend will continue because it is the result of economic complementarities between China and Africa. Chinese funding has often taken the form of resources for infrastructure loans - deals in which China funds and builds infrastructure and is repaid with natural resources obtained from a new extraction project. Angola and others have already increased their infrastructure stocks thanks to these loans and this memo argues that these loans are ideal for African countries with untapped resources. Resources for infrastructure loans have allowed African countries to obtain quality infrastructure quickly and cheaply, with a sustainable form of debt and minimal loss to corruption. Finally, we argue that African governments can maximize the benefits of such deals by increasing the use of local labor and inputs, adopting clear environmental standards and guidelines, eliminating signature bonuses, and planning for operations and maintenance of new infrastructure stocks.

6. References

- AICD (2010), “*Africa's Infrastructure: A Time for Transformation.*” The International Bank for Reconstruction and Development / World Bank.
- Alden, C., Alves, A., (2009), “*China and Africa's Natural Resources: The Challenges and Implications for Development and Governance.*” SAIIA occasional paper 41.
- Barder, O., (2006), “*A Policymaker's Guide to Dutch Disease.*” Center for Global Development, Working Paper 91.
- Bosshard, P., (2008), “*China's Environmental Footprint in Africa.*” China in Africa Project, SAIIA.
- Brautigam, D., (2010), “*The Dragon's Gift: the true story of China in Africa.*” Oxford University Press.
- Calderón, C., (2008) “*Infrastructure and Growth in Africa.*” Working Paper 3, Africa Infrastructure Country Diagnostic, World Bank.
- Campos, I., Vines, A., (2008) “*Angola and China: A Pragmatic Partnership.*” Centre for Strategic and International Studies.
- CCS, (2010), “*Evaluating China's FOCAC commitments to Africa and mapping the way ahead.*”
- CIA Factbook, (2010).
- Downs, E., (2007), “*The Fact and Fiction of Sino- African Energy Relations.*” China Security, Vol. 3 No. 3 Summer, pp. 42 - 68 World Security Institute.
- Eberhard, A., Foster, V., Briceño-Garmendia, C., Ouedraogo, F., Camos, D., Shkaratan, M., (2008), “*Underpowered: The State of the Power Sector in Sub-Saharan Africa.*” Background Paper 6, Africa Infrastructure Sector Diagnostic, World Bank.
- EAWAG, (2006), *Independent Review of the Environmental Impact Assessment for the Merowe Dam Project (Nile River, Sudan).*”
- Escribano, A., Guasch, J. L., Pena, J., (2008), “*Impact of Infrastructure Constraints on Firm Productivity in Africa.*” Working Paper 9, Africa Infrastructure Sector Diagnostic, World Bank.
- Foster, V., (2008), “*The changing landscape of infrastructure finance in Africa*”, PPIAF Gridlines, note 43.
- Foster, V., Butterfield, W., Chen, C., Pushak, N., (2008), “*Building Bridges: China's growing role as infrastructure financier for Sub-Saharan Africa.*” PPIAF / World Bank.
- Goldstein A., Pinaud, N., Reisen, H., Chen, X., (2006) “*The rise of China and India, what's in for Africa?*” OECD Development Centre Studies.
- ICA, (2006), Annual Report.
- ICA, (2008), Annual Report.
- Kandiero, T., (2009), “*Infrastructure Investment in Africa.*” AfDB Development Research Brief 10.
- Kaplinisky, R., (2008), “What Does the Rise of China Do for Industrialisation in Sub-Saharan Africa?”, Review of African Political Economy, 35(115).
- Kauffmann, C., (2008), “*Engaging the Private Sector in African Infrastructure.*” NEPAD-OECD Africa Investment Initiative.
- Keenan, P. J., (2008), “*Curse or Cure? China, Africa, and the Effects of Unconditioned Wealth.*” Berkeley Journal of International Law.

Minges, M., Briceño-Garmendia, C., Williams, M., Ampah, M., Camos, D., Shkratan, M., (2008), *“Information and Communications Technology in Sub-Saharan Africa: A Sector Review.”* Background Paper 10, Africa Infrastructure Sector Diagnostic, World Bank.

Reisen, H., (2007), *“Is China Actually Helping Improve Debt Sustainability in Africa?”* G-24 Policy Brief 9.

Reisen, H., Ndoeye, S., (2008), *“Prudent versus Imprudent Lending to Africa: From Debt Relief to Emerging Lenders.”* OECD Development Centre Working Paper 268.

UNCTAD, (2009), *“Investment Policy Review: Nigeria.”* World Bank.