

SUMMARY OF BACKGROUND PAPER 15

AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

Financing Public Infrastructure in Sub-Saharan Africa: Patterns, Issues, and Options

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About AICD

This study is part of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a more solid empirical foundation for prioritizing investments and designing policy reforms in the infrastructure sectors in Africa.



AICD will produce a series of reports (such as this one) that provide an overview of the status of public expenditure, investment needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The World Bank will publish a summary of AICD's findings in spring 2008. The underlying data will be made available to the public through an interactive Web site allowing users to download customized data reports and perform simple simulation exercises.



The first phase of AICD focuses on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.



AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. Financing for AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.



This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from www.infrastructureafrica.org. Freestanding summaries are available in English and French.

Inquiries concerning the availability of datasets should be directed to vfoster@worldbank.org.

Summary

To be credible, any plan for scaling up infrastructure in Africa must rest on a thorough evaluation of how fiscal resources are allocated and financed. Because in every plausible scenario the public sector retains the lion's share of infrastructure financing, with private participation remaining limited, a central purpose of such an evaluation is to identify where and how fiscal resources can be better used—if not increased—without jeopardizing macroeconomic and fiscal stability. The stakes are high, because the magnitude of Africa's infrastructure needs carries a commensurate potential for misuse of scarce fiscal resources.

We analyze recent public expenditure patterns to identify ways to make more fiscal resources available for infrastructure. We do this in three ways. First, we quantify the level and composition of public spending on infrastructure so as to match fiscal allocations to the particular characteristics of individual subsectors and to countries' macroeconomic type (oil-exporting, fragile, middle-income, and low-income). Second, we evaluate public *budgetary* spending for infrastructure against macroeconomic conditions to get a sense of the scope for making additional fiscal resources available. And, third, we look for ways to make public spending for infrastructure more efficient, so as to better use existing resources.

The Government Finance Statistics of the International Monetary Fund are neither comprehensive nor disaggregated enough to support an analysis of the fiscal costs of infrastructure for the period 2001–06. For that reason, our analysis is based on a new, standardized cross-country dataset of fiscal indicators for infrastructure that covers, but also extends beyond, spending from central government budgets. State-owned enterprises (SOEs) and extrabudgetary financing vehicles are also covered, as are private operators, as long as the assets they operate belong to the state or the operator continues to rely on public subsidies. Expenditure by subnational jurisdictions is only partially covered, however. Data are collected in such a way as to permit cross-classification by economic categories (including capital and current spending) as well as functional categories—information and communication technologies (ICT), power, roads, water, and sanitation. As far as possible, both budgeted and actual expenditures are recorded.

Any exercise of this kind encounters data limitations. First, because it was not feasible to visit all subnational entities, some decentralized infrastructure expenditures probably have been underrepresented, with particular implications for the water sector. Second, it was not always possible to fully identify which items of the budget are financed by donors, and contributions by nongovernmental organizations (NGOs) to rural infrastructure projects are likely to have been missed completely. Third, it was not always possible to obtain full financial statements for all of the infrastructure special funds that we identified. Fourth, accurate recording of annual changes in fixed capital formation (capital expenditure) of SOEs remains a methodological challenge. Fifth, accurate measurement of existing public infrastructure stock will require further methodological development.

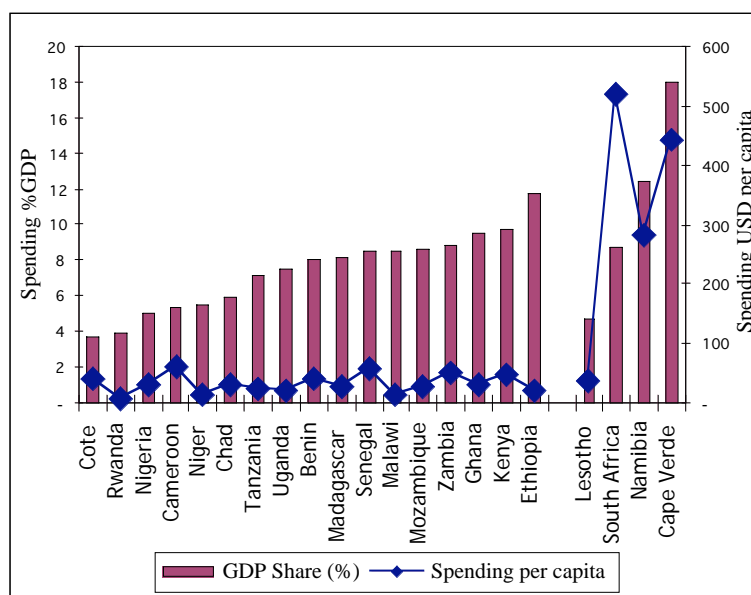
Public infrastructure spending: the headlines

Most governments in Sub-Saharan Africa spend about 6–12 percent of their gross domestic product (GDP) each year on infrastructure, understood as comprising ICT, power, roads, water, and sanitation

(figure A). Roughly half spend more than 8 percent of GDP, while only a quarter of countries spend less than 5 percent, the level commonly encountered among the countries of the Organisation for Economic Co-operation and Development. Cape Verde, Ethiopia, and Namibia spend well above 10 percent of their GDP on infrastructure. In the few middle-income countries of the region for which comparative information is available the level of public spending is known to be between 6 and 8 percent of GDP.

Expressed as shares of GDP, these fiscal efforts seem larger than when put in dollar terms. Most countries of the region spend less than \$600 million a year on infrastructure services—less than \$50 per person. Among landlocked countries, whose infrastructure needs tend to be particularly high, the annual total is less than \$30 per capita. These annual expenditures pale in comparison with the amounts needed. An investment budget of US\$100 million purchases no more than about 100 MW of electricity generation, or 100,000 new household connections to water and sewerage, or 300 kilometers of two-lane paved road.

Figure A. Fiscal flows devoted to infrastructure



Source: Africa Infrastructure Country Diagnostic, Fiscal Baseline (2008).

Note: Based on annual averages for the period 2001–05.

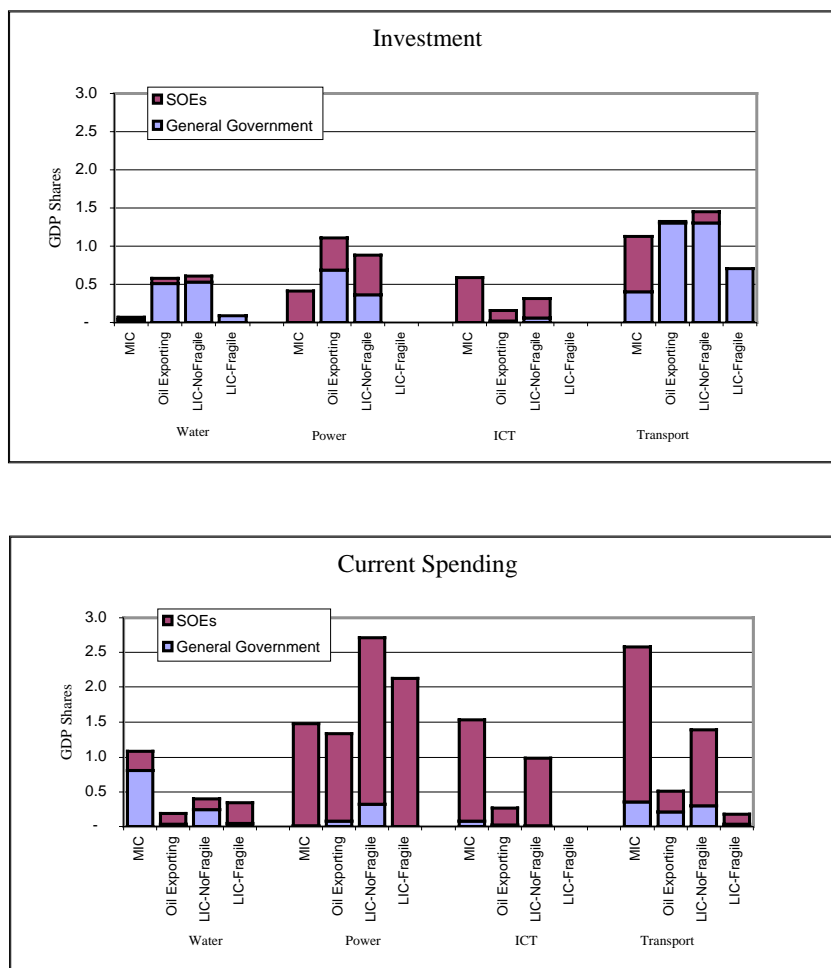
The anatomy of public spending

Most public spending on infrastructure in Sub-Saharan Africa passes through SOEs. SOEs have a particularly large role in the middle-income countries, where they account for over 70 percent of all public infrastructure spending. In Namibia, for example, 90 percent of expenditures on infrastructure are made by SOEs. In non-oil-exporting low-income countries, the share of expenditures realized by SOEs is close to 60 percent, or just below two-thirds of total infrastructure spending.

The bulk of the fiscal resources that pass through SOEs go for current spending. Current spending includes spending on operations and maintenance, which is essential to harness the economic returns of capital. However, most of recorded current spending relates to so-called nonproductive expenses, namely wages and salaries. High levels of recurrent spending may indicate that operational inefficiencies are diverting resources away from investment.

Governments are the most prominent financiers of infrastructure investment in Sub-Saharan Africa. Except in the middle-income countries, governments are responsible for between 80–90 percent of total capital investment, consistently allocating at least 80 percent of their infrastructure budgets to investment. In low-income countries that are aid-dependent or that export oil, the prevalence of governments as investors is driven by their role in channeling external funds and/or natural resource royalties. Most external development funds are earmarked by donors for investment. The dominant role of the central government as an investor is consistently found in most subsectors: accounting for 80 percent of total public investment in transport and water supply, and about 40 percent in energy (figure B). The noticeable exceptions to this pattern are the ICT sector and, as noted, the middle-income countries.

Figure B Public infrastructure spending by sector and institution



Source: AICD, Fiscal Baseline (2008).

Even though capital budgets may fall far short of actual needs, on average, most countries are not able to spend more than one-third of the budgeted amounts. For a number of countries we were able to compare actual capital spending with the amounts originally budgeted. The budget execution ratios that emerged ranged from 28 percent (Benin) to 89 percent (Madagascar), with the average being 66 percent. This means that capital spending in the region might be 50 percent higher if only government agencies had the capability to spend all of the resources allocated to them. The problems behind the low execution rates include poor planning, deficiencies in project preparation, and delays in procurement. Budget execution ratios for current spending are, on average, a little higher.

Transport and energy sectors together absorb the lion’s share of infrastructure spending—about 80 percent in low-income countries. The heavy spending on power is a response to the widely recognized power crisis on the continent. The efforts of the middle-income countries to support energy development

contrast starkly in absolute spending terms with those of the poorer countries. Middle-income countries spend almost 5 times more on power than do aid-dependent low-income countries. Actual spending for water may be higher than shown here, because of difficulties in capturing spending data from municipal water utilities.

Sectoral allocations differ markedly across different groups of countries. Aid-dependent countries tend to show relatively high levels of investment in roads and water, which together account for 80–95 percent of donors' allocations to infrastructure in the region. Funds from donors make up about 50 percent of water spending and 25 percent of roads spending. By contrast, donors' commitments to the energy sector have been low or inexistant in sharp opposition to the efforts of low-income countries that by themselves have been allocating close to 25 percent of their public infrastructure budgets to power to redress chronic underinvestment in that sector.

General government expenditure

For several years running, a favorable external environment (notably high commodity prices) and sustained domestic economic growth averaging at least 4.5 percent annually have expanded the resources available to the governments of Sub-Saharan Africa. The economies of oil-producing countries have grown at the fastest pace (up to 15 percent a year), for obvious reasons. Non-resource-intensive countries benefited from debt relief and successful policy reforms that offset the negative impacts of higher oil prices. Even heavily indebted poor countries (HIPC) grew at an annual average rate of 5.5 percent. Domestic revenues have been the largest source of additional funds for resource-intensive countries, whereas external grants played the most significant role for the poorest countries in the region.

The favorable external environment helped many countries expand their budgets. In the period 2001–05, Sub-Saharan governments' budgets grew by almost 1.9 percent of GDP, with the regional average driven largely by increases in middle-income countries (table A). Not all countries benefited, however. Zambia's budget contracted by more than 8 percent, while that of the Democratic Republic of Congo chalked up a 9 percent increase.

The additional budgetary resources helped low-income aid-dependent countries to bolster capital investments, including infrastructure. As a share of GDP, capital investment increased in the low-income countries by more than 1 percent in 2002–05. About 40 percent of the additional resources were allocated to clearly favored infrastructure sectors.

It is striking that the oil-exporters and middle-income countries *decreased* their investment despite having more fiscal resources available. The oil-exporting countries lowered their capital expenditures on average by 3.3 percent of GDP. In oil-exporting countries, the decrease in budgetary expenditure was largely absorbed by a significant reduction in infrastructure expenditures. To a large extent this reflects developments in Nigeria, where infrastructure expenditures decreased by 2.2 percentage points of GDP during the study period. The middle-income countries appear to have chosen to devote more resources to maintenance. Most of their additional capital budget was allocated outside infrastructure, but not to health and education, as the table shows.

Table A Net change in central government budgets by country group, financing source, and destination, 2001–06
% GDP

| Country group | Net central government expenditure budget | Financing sources | | Spending allocations | |
|------------------------------|---|----------------------------|-----------------------|-------------------------|-------------------------------|
| | | Of which domestic revenues | Of which donor grants | Of which infrastructure | Of which health and education |
| Middle-income | 4.08 | 3.40 | (0.03) | 0.02 | 0.13 |
| Oil-exporting | (3.73) | 5.25 | (0.07) | (1.43) | (0.34) |
| Low-income, not fragile | 1.69 | 0.83 | 1.98 | 0.54 | 0.93 |
| Democratic Republic of Congo | 9.06 | 3.63 | 4.84 | — | 0.93 |
| Africa average | 1.89 | 3.04 | 0.57 | (0.14) | 0.24 |

Source: AICD, Fiscal Database, 2008; IMF Statistical Appendixes, WB DDP.

Note: Averages weighted by national GDP. Totals may not add up.

— = data not available.

Budget efficiency

Infrastructure stock in many of the region's countries are sorely in need of rehabilitation after years of poor maintenance. The percentage requiring rehabilitation ranges from 12 percent (Burkina Faso) to 48 percent (Democratic Republic of Congo)—the average for the survey group is 30 percent. Rehabilitation needs are significantly higher for rural infrastructure (35 percent) than for other types (25 percent), reflecting the difficulty of maintaining assets in isolated rural areas. Because rehabilitating assets is much more costly (in present-value terms) than maintaining them well, the magnitude of the rehabilitation backlogs indicates substantial inefficiency in lifecycle spending on infrastructure.

Maintenance is the most challenging aspect of road spending. In environments characterized by weak fiscal management (nontransparent and politically dominated budget processes), assets often are neglected. Because maintenance yields little observable immediate benefit and is easily deferred, its budgetary allocations often are not protected by the executive or parliament. Furthermore, in Africa, donors have a dominant role in channeling funds to the sector. They earmark much of their funding, extended on concessional terms, for investment, which has the effect of making maintenance more costly than investment, because most maintenance funds must be raised domestically. Although the share of external financing that is allocated to road rehabilitation has increased in recent years, road spending in Sub-Saharan Africa is dominated by new construction, leaving maintenance a secondary priority.

Roughly half of the countries in the sample have shortfalls of 40 percent or more in annual maintenance. Expenditure shortfalls are greater than 60 percent in Chad, Uganda, and Niger. Countries that have established well-functioning road funds tend to be more successful at maintaining their road networks and reducing the volatility of spending.

The hidden cost of utilities' inefficiencies

Reducing inefficiencies in infrastructure operations is perhaps the most practical and realistic way of making more resources available for infrastructure in the region. While most countries are devoting considerable effort to improving infrastructure, they are severely constrained in what they can spend.

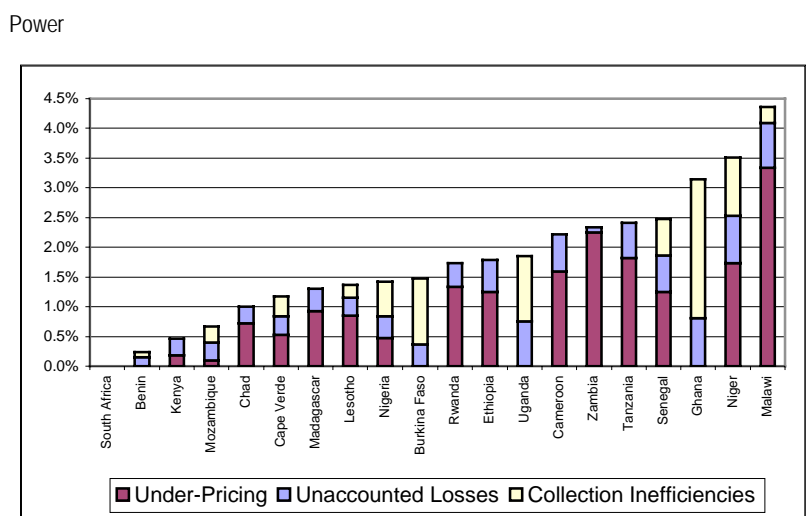
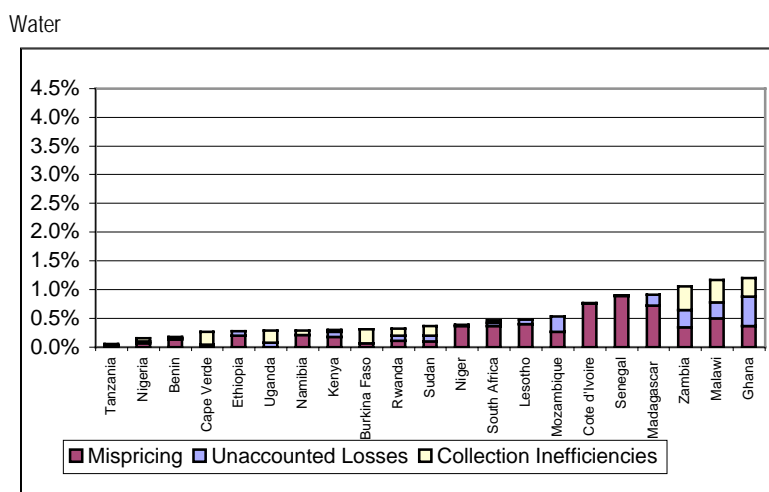
They have trouble raising domestic revenue and in reallocating revenue from other uses, which often requires structural reforms. By contrast, efficiency improvements can quickly enlarge governments’ availability of funds, allowing them to provide new services. Because spending on infrastructure consumes a significant share of GDP, even small efficiency gains can contribute large savings.

For electricity, water supply, and, to some extent, telecommunications, we measure inefficiencies by quantifying their hidden costs. For the water and power sectors, hidden costs are estimated by using the end-product approach. The methodology identifies three relevant quasi-fiscal activities in utilities: underpricing (charging less than the economic cost of the good), undercollection (where bills are never sent or allowed to go unpaid), and excessive unaccounted losses (to leaks or theft, for example). Hidden costs are then estimated by comparing actual indicators of a functioning SOE against ideal norms of cost-recovery, collection ratios, and distribution losses.

For telecommunications utilities, we quantify the hidden cost of labor redundancies by comparing partial labor-productivity ratios of existing telecom incumbents against world-class fixed-line providers in OECD countries.

Quasi-fiscal activities in Africa represent average annual hidden costs of the following (minimum) magnitudes: 0.5 percent of GDP in the water sector (figure C), 0.8 percent in the power sector, and 0.1 in the telecom sector. The smaller economic size of water utilities, together with skewed coverage in the sample because of decentralization and fragmentation, partially explains their lower hidden costs. Underpricing is the main source of hidden costs in both power and water utilities. Not only is underpricing inefficient, but the associated capital subsidies are hugely inequitable because access to these services is skewed toward the better off, with

Figure C Hidden costs for water and power utilities as share of GDP



Source: Authors’ own calculations using data from the AICD Database

substantial shares of the poor remaining unconnected to the electrical grid and water supply network.

In middle-income countries, unaccounted losses stand out as the greatest source of inefficiency for power utilities, particularly maintenance-deprived distribution networks. Aid-dependent countries show slightly higher levels of hidden costs relative to their peers, largely because of mispricing, and, in the water sector, poor collection practices. In the telecom sector, countries that have maintained state ownership of telecommunications incumbents, thereby deterring competition, not only are forgoing future tax revenues from expanded business activity but also are creating an additional burden of hidden costs from inefficiency (usually a bloated workforce). Such costs can exceed 0.1 percent of GDP.

Emerging messages

The countries of the region are devoting substantial shares of their GDP to infrastructure (6–12 percent when all sources are taken into account), but that does not amount to much in absolute terms, because the economies in question are small. On average, low-income countries are spending less than \$50 per capita per year, with public investment being only a fraction of this.

There is a marked division of labor between SOEs and central governments. While SOEs account for the bulk of infrastructure spending in most countries, they undertake very little capital spending. Most public investments for infrastructure continue to be made through central government budgets, with the resulting assets often transferred to SOEs for subsequent operation and maintenance.

Despite a favorable budget environment, only aid-dependent countries seem to be allocating additional resources to infrastructure. The combination of a commodity boom and widespread debt relief has created substantial buoyancy in government budgets. In the case of aid-dependent countries, about 30 percent of the additional funds have been allocated to infrastructure. However, in middle-income countries almost none of the additional resources gleaned from the recent good years have gone for infrastructure. In oil-exporting countries infrastructure investment has actually *fallen* even as resource revenues have surged.

Regardless of how windfall revenues are spent, governments in the region could substantially enlarge their fiscal space by redressing inefficiencies in infrastructure spending. Three major sources of inefficiency have been identified here: inattention to maintenance, failures to spend budgeted funds, and hidden costs.

There is substantial direct and indirect evidence of undermaintenance, which leads to higher costs over the infrastructure lifecycle. On average, almost a third of the infrastructure assets of the countries of the region are in need of rehabilitation. With the present value of rehabilitating infrastructure exceeding the cost of preventive maintenance, it is easy to see that, over time, countries are spending more than they need to spend to preserve a fixed amount of infrastructure stock.

Second, very low ratios of execution of capital budgets point the way to an easy and budget-neutral increase in public investment—if only execution ratios can be raised. Addressing the causes of low budget execution deserves very serious attention, as solving the problem could increase public investment by 50 percent without any increase in budgeted resources. Moreover, until such deficiencies are addressed it will remain difficult to achieve higher levels of investment, even if more external resources are injected.

Third, the hidden costs of power and water utilities absorb some 2.5 of GDP, indicating a major potential dividend in return for the right set of actions. Underpricing is by far the largest contributor to hidden costs in power and water utilities, although, as noted, unzealous bill collection and distribution losses are also important.