AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

COUNTRY REPORT

Uganda's Infrastructure: A Continental Perspective

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Africa's Infrastructure | A Time for Transformation

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AICD
AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

About AICD and its country reports

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

The AICD is based on an unprecedented effort to collect detailed economic and technical data on African infrastructure. The project has produced a series of original reports on public expenditure, spending needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. *Africa's Infrastructure—A Time for Transformation*, published by the World Bank and the Agence Française de Développement in November 2009, synthesized the most significant findings of those reports.

The focus of the AICD country reports is on benchmarking sector performance and quantifying the main financing and efficiency gaps at the country level. These reports are particularly relevant to national policy makers and development partners working on specific countries.

The AICD was commissioned by the Infrastructure Consortium for Africa following the 2005 G8 (Group of Eight) summit at Gleneagles, Scotland, which flagged the importance of scaling up donor finance for infrastructure in support of Africa's development.

The AICD's first phase focused 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, Côte d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage was expanded to include as many of the remaining African countries as possible.

Consistent with the genesis of the project, the main focus is on the 48 countries south of the Sahara that face the most severe infrastructure challenges. Some components of the study also cover North African countries so as to provide a broader point of reference. Unless otherwise stated, therefore, the term "Africa" is used throughout this report as a shorthand for "Sub-Saharan Africa."

The World Bank has implemented the AICD with the guidance 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 (AfDB), the Development Bank of Southern Africa (DBSA), and major infrastructure donors.

Financing for the AICD is provided by a multidonor trust fund to which the main contributors are the United Kingdom's Department for International Development (DFID), the Public Private Infrastructure Advisory Facility (PPIAF), Agence Française de Développement (AFD), the European Commission, and Germany's Entwicklungsbank (KfW). A group of distinguished peer reviewers from policy-making and academic circles in Africa and beyond reviewed all of the major outputs of the study to ensure the technical quality of the work. The Sub-Saharan Africa Transport Policy Program and the Water and Sanitation Program provided technical support on data collection and analysis pertaining to their respective sectors.

The data underlying the AICD's reports, as well as the reports themselves, are available to the public through an interactive Web site, www.infrastructureafrica.org, that allows users to download customized data reports and perform various simulations. Many AICD outputs will appear in the World Bank's Policy Research Working Papers series.

Inquiries concerning the availability of data sets should be directed to the volume editors at the World Bank in Washington, DC.

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Acknowledgments

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The paper is based on information provided from colleagues in the Uganda country team; notably, Mukami Kariuki (sector leader), Jos Verbeek (lead economist), Anton Dobronogov (senior economist), Charles Kunaka (senior trade specialist), Negede Lewi (senior highway engineer), Somin Mukherji (senior financial analyst), Victorio Ocaya (senior highway engineer), Robert Scholetterer (senior financial analyst) and Rachel Sebudde (senior economist).

Synopsis

Infrastructure contributed 1.5 percentage points to Uganda's improved per capita growth performance during the 2000s. Moreover, raising the country's infrastructure endowment to that of the region's middle-income countries could boost annual growth by as much as 3.8 percentage points.

Uganda has made substantial progress on its infrastructure agenda in recent years. The country has been a regional leader in terms of sector reform and liberalization. The early and successful ICT reform detonated a huge expansion in mobile coverage and penetration, resulting in a highly competitive market. Power sector restructuring paved the way for a rapid doubling of power generation capacity. Uganda has met the Millennium Development Goal for sanitation and is on track to meet the water goal; it has made effective use of performance-based contracting to improve utility performance. Air transport liberalization has led to growing traffic and good connectivity with East African hubs. The road freight sector is also competitive and offers relatively good service compared to other parts of Africa.

However, a number of important challenges remain. Despite reforms, the power sector continues to hemorrhage resources because of underpricing and high distribution losses, while electrification rates remain very low. Providing adequate resources for road maintenance is a challenge, and further investment is needed to increase rural connectivity and improve road safety. In terms of regional integration, Uganda still faces significant border delays and needs to upgrade the corridors that connect it to the hinterland countries (such as emerging South Sudan). In addition, there is significant potential for the further expansion of irrigation infrastructure.

Addressing Uganda's infrastructure challenges will require sustained expenditure of around $1.4 billion per year over the next decade, strongly skewed towards capital expenditure. That level of spending is equivalent to some 16 percent of GDP, comparable to what China has invested in infrastructure in recent years but a stretch for Uganda's economy. About one-third of the spending needs relate to the power sector.

Uganda already spends approximately $1 billion per year on infrastructure, equivalent to about 11 percent of GDP. Uganda enjoys significant levels of private finance for infrastructure, in addition to strong donor support. Almost half of existing spending is on the power sector. A further $0.3 billion a year could be captured by eliminating inefficiencies, chiefly underpricing and distribution losses in the power sector.

Uganda's annual infrastructure funding gap is about $0.4 billion per year, most of which is associated with irrigation as well as water and sanitation infrastructure. The gap could be significantly reduced by adopting lower cost technologies for water and sanitation services. Following its recent oil discoveries, Uganda is in a position to raise additional public funding for infrastructure from increased fiscal receipts. Given the country's track record, it may also be possible to capture more private finance for infrastructure.

The continental perspective

The Africa Infrastructure Country Diagnostic (AICD) has gathered and analyzed extensive data on infrastructure in more than 40 Sub-Saharan countries, including Uganda. The results have been presented in reports covering different areas of infrastructure—information and communication technology (ICT), irrigation, power, transport, and water and sanitation—and different policy areas, including investment needs, fiscal costs, and sector performance.

This report presents the key AICD findings for Uganda over the period 2001 to 2006, allowing the country's infrastructure situation to be benchmarked against that of its African peers using data collected over the same period, and providing a baseline against which to assess Uganda's subsequent progress in the infrastructure sectors. Uganda is a low-income state that has recently discovered oil; therefore, both low-income and resource-rich benchmarks will be used to evaluate its performance. Detailed comparisons will also be made with immediate regional neighbors in the East African Community (EAC) in some cases.

Several methodological issues should be borne in mind. First, because of the cross-country nature of data collection, a time lag is inevitable. The period covered by the AICD runs from 2003 to 2009. Most technical data presented are for 2009 (or the most recent year available), while financial data are typically averaged over the available period to smooth out the effect of short-term fluctuations. Data on benchmark countries, however, typically relate to the somewhat earlier period 2001 to 2006. Second, to make comparisons across countries, it was necessary to standardize the indicators and analysis so that everything was done on a consistent basis. This means that some of the indicators presented here may be slightly different from those that are routinely reported and discussed at the country level.

Country context

Despite conflict, political unrest, and various geographical disadvantages, Uganda has sustained relatively high and robust growth rates over two decades. Annual gross domestic product (GDP) growth rates averaged 7 percent in the 1990s and accelerated to more than 8 percent over the first seven years of the 2000s. Growth was around 6.1 percent in 2010, and is predicted to grow to over 7 percent in the foreseeable future. But due to rapid population growth, real GDP growth per capita averaged only 3.4 percent in the 1990s and around 4 percent in the 2000s.

Strong growth performance has contributed to a substantial decline in poverty levels. The proportion of people living in poverty fell from 57 percent in 1992–93 to 31 percent in 2005–06. However, significant inequities persist between urban and rural areas. The national Gini coefficient[1] rose from 0.35 percent in 1997 to 0.41 percent in 2006, in part because Uganda's growth path has created greater opportunities in urban areas in the central and western parts of the country, while more remote rural areas, particularly wide swathes of the north and east, , have not grown as fast. Nrthern Uganda, which has now

[1] The Gini coefficient is a measure of the inequality of income distribution. It ranges between zero (describing a situation where everybody has the same income level) to one (describing a situation where all income is concentrated in the hands of one person). In practice, Gini coefficients typically fall in the range of 0.2 to 0.6.

emerged from conflict, recorded high and persistent levels of income poverty at 60 percent of the population. While new opportunities are opening up in the post-conflict environment, agricultural production has yet to reach levels that would have a sustained impact on poverty.

Uganda is on track to meet at least two of eight Millennium Development Goals (MDGs). The country is close to halving poverty and has made substantial progress toward achieving universal primary education and addressing gender inequality. Uganda may even achieve the targets for combating HIV/AIDS, malaria, and other communicable diseases, ensuring environmental sustainability, and developing global partnerships. MDGs on reducing child mortality and improving maternal health, however, are unlikely to be met. Despite progress, Uganda ranked 156 of 179 in the fiscal 2009 Human Development Index (HDI) of the United Nations Development Programme (UNDP). The low overall ranking reflects the low starting point for Uganda along many development related indicators.

Uganda has one of the youngest and most rapidly growing populations in the world. The country's population growth rate, at 3.3 percent in 2010, is well above the African average. Population growth has been consistently high aside from during the AIDS epidemic in the early 2000s. The total fertility rate is estimated at 6.7 children per woman according to the government's data and 6.4 according to UN data. About half (48.7 percent) of Uganda's population is below 15 years of age, well beyond Sub-Saharan Africa's average of 43.2 percent and the world average of 26.8 percent. Both the high level of fertility and the youthfulness of the population have created a very high youth dependency ratio (World Bank 2011b).

Improvements in services—health, education, and infrastructure—have been unable to keep pace with rapid population growth. Sustaining the positive trends in growth will require massive investments in all of these areas, but in infrastructure in particular. Improved transport services will be needed to connect economically depressed areas and producers to markets and improve mobility of labor. Industry also needs reliable electricity to boost productivity and competitiveness. Levels of urbanization in Uganda in 2002 were relatively low compared to other African countries at 12 percent, but are expected to more than double over the next 15 years to reach almost 35 percent. Rapid urbanization needs to be accompanied by better urban services such as adequate access to water and sanitation.

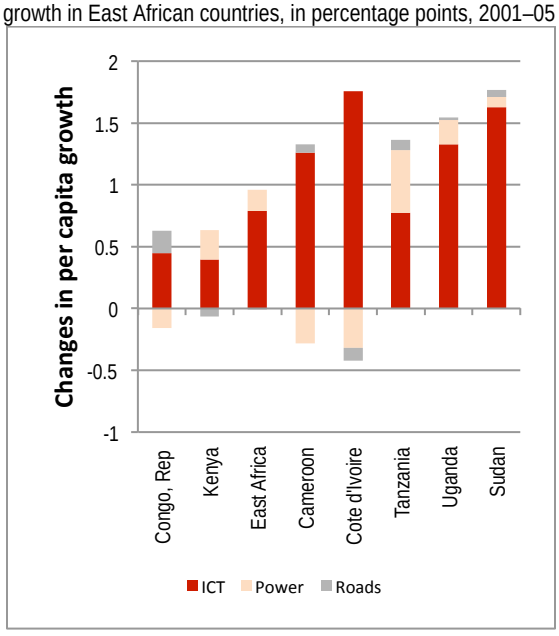
The recent discovery of oil reserves promises significant fiscal and development gains to the country. Even under conservative price assumptions, oil production could increase annual government revenues by about 10 percent of GDP within 6–10 years (World Bank 2011a) Higher oil income presents greater economic opportunities as well as challenges. Increased oil income can be expected to have positive repercussions in the economy as a whole, but evidence across the world points to a mixed story. In particular most cases of increased oil wealth and dependence on natural resources have produced outcomes of increased income disparity, often resulting in political instability (Angola, Bolivia, and Nigeria provide clear examples). Through a phenomenon known as Dutch Disease, oil booms can also have adverse consequences for the nonoil sectors of the economy, as an appreciating exchange rate caused by surging oil exports renders other products uncompetitive (Adam and Bevan 2003; Garber 2004; Same 2008). It will therefore be critical for Uganda to capitalize on oil revenues—particularly during boom periods—and use them to make investments in assets such as infrastructure that will help to promote economic diversification into more sustainable sectors.

Why infrastructure matters

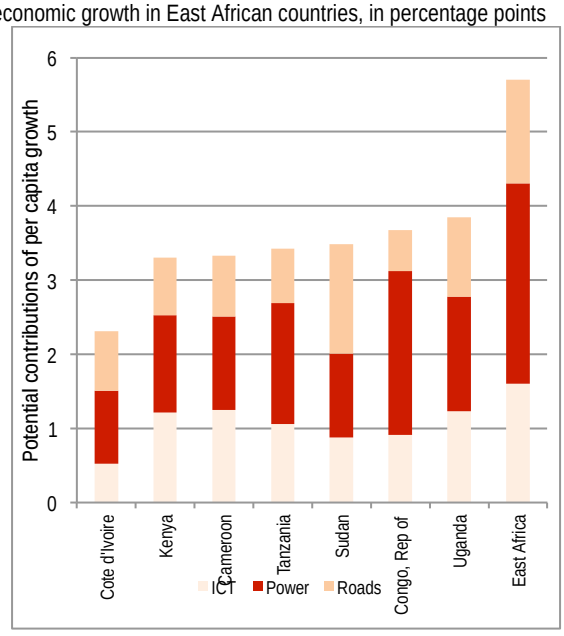
Adequate infrastructure is key for economic growth and competitiveness in Uganda. The country's current inadequate infrastructure is impeding faster growth. Empirical evidence between the 1900s and early 2000s shows that infrastructure improvements in Uganda contributed over 1.5 percentage points to Uganda's per capita growth rate (figure 1a). The ICT sector made the strongest impact on growth followed by power as a distant second. Looking ahead, if Uganda could improve its infrastructure to the level of Africa's best performing country—Mauritius—growth performance could be enhanced by as much as 3.8 percentage points per capita, with the most significant contributions coming from upgrades to the power and ICT infrastructure (figure 1b).

Figure 1. Infrastructure's contribution to economic growth: Benchmarking Uganda against other Sub-Saharan nations, 1995–2005

a. Infrastructure's contribution to annual per capita economic growth in East African countries, in percentage points, 2001–05



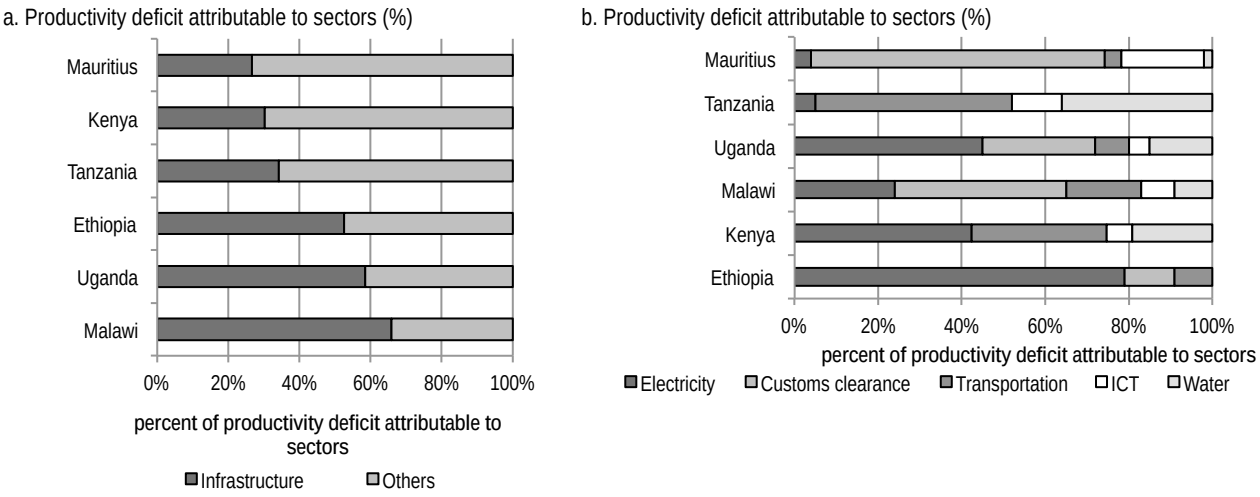
b. Potential contributions of infrastructure to annual per capita economic growth in East African countries, in percentage points



Source: Calderón 2009.
Note: ICT = information and communication technology.

Evidence from enterprise surveys suggests that in 2006 infrastructure constraints were responsible for as much as 58 percent of the productivity handicap faced by Ugandan firms (figure 2a), with the remainder traceable to poor governance, red tape, and financing constraints. Infrastructure constraints in Uganda at that time were among the highest in the region. Inadequate power was the constraint that weighed most heavily on the country's firms (figure 2b). Customs clearance processes before export was the second largest constraint hindering firms' productivity. The average output loss owing to electricity supply problems is about 10 percent; a number higher than in most countries in Sub-Saharan Africa (World Bank 2005). However, since then, some improvements have been made including the formation of a common Customs Union under the umbrella of the East African Common Market.

Figure 2. Infrastructure deficits constrain firms' productivity, 2002–06



Source: Escribano, Guasch, and Pena 2010.

The state of Uganda's infrastructure

This report begins by reviewing achievements and challenges in each of Uganda's major infrastructure sectors, with the key findings summarized in table 1. Hereafter, attention turns to the problem of how to finance Uganda's infrastructure needs.

Poverty rates are more pronounced in the northeast. This disparity comes despite some degree of homogeneity in the country's elevation and topography, and is reflected in uneven distribution of infrastructure networks that hinder more uniform development of the country as a whole. The conflict that has been experienced in the northeast of the country to a significant extent explains these patterns.

Economic activity is largely concentrated along the coast of Lake Victoria and in pockets that border Rwanda and the Democratic Republic of Congo. The area around Kampala has the highest concentration of economic activity in Uganda overall. The area that borders Lake Victoria and spreading into the south central part of Uganda has a density of around 100–500 inhabitants per square kilometer (km^2), while the rest of country is relatively sparsely populated, with less than 50 inhabitants per 100 km^2 (figures 3a and 3b).

Oil discoveries have been made in western Uganda in the vicinity of Lake Albert bordering the Democratic Republic of Congo. The Lake Albert region is an environmentally sensitive area, rich in biodiversity. Pipeline infrastructure to transport the oil to regional markets has been under consideration.

Uganda has sizable expanses of fertile land and is exploiting its agricultural potential (figure 3d). In a large share of the land in the eastern-central part of the country, agricultural cultivation is relatively intense with more than half of available arable land under cultivation. Uganda is increasingly perceived as a potential breadbasket for East Africa with agricultural exports comprising 50 percent of all export revenues (World Bank 2010a). But climate variability is resulting in low crop yields, while increased

human activity has led to degraded soils . Rainfall has also become more variable in nature wit**]**h more frequent floods and droughts.

Table 1. The achievements and challenges of Niger's Uganda infrastructure sectors

	Achievements	Challenges
Transport	Relatively low cost of moving goods across borders. Trucking sector is liberalized and more mature than other parts of Africa.	Improving infrastructure and transport services to hinterland countries particularly South Sudan. Addressing bottlenecks at regional ports.
Roads	Adequate road density and high traffic volumes. National network is in relatively good condition.	Providing adequate funding for road maintenance. Improving rural road quality and connectivity. Improving road safety conditions.
Railways	Kenya-Uganda railway is one of the more heavily used railways in East Africa.	Boosting traffic and productivity.
Air transport	Liberalized air transport markets with growing traffic and good connectivity to East African hubs.	Boosting air safety standards.
Water resources	Well endowed with water resources relative to benchmarks.	Managing conflicts between alternative water uses. Protecting water resources, such as wetlands, from encroachment, degradation and pollution
Irrigation	Development of irrigation has been strategically planned around areas of high cultivation.	Exploiting major potential for development of high-return, small-scale schemes on the eastern side of the country.
Water supply and sanitation	Achievement of MDG for sanitation and close to achieving MDG for water based on expansion of intermediate service levels. Efficiency of water utility improved significantly due to use of performance contracts.	Expanding supply of utility water to keep pace with rapid urbanization. Increasing access to improved water and sanitation services for poor households Addressing stubbornly high system losses and further improving cost recovery.
Power	Major power sector reform. Recent doubling of power generation capacity.	Accelerating electrification, particularly in rural areas. Addressing very high system losses and improving cost recovery of the utility.
Information and communication technology (ICT)	Early and successful ICT sector reform. Huge expansion of mobile telephony penetration and footprint with highly competitive market. Terrestrial connection to new submarine cables via Kenya.	Optimizing industry tax burden. Reducing costs of broadband services.

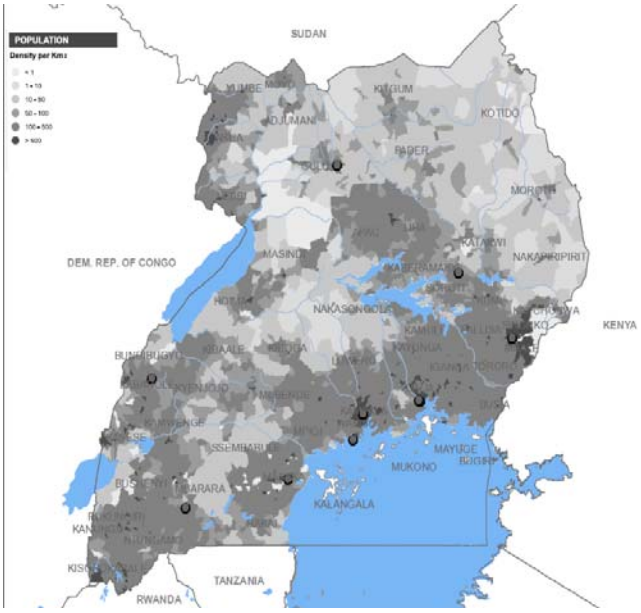
Source: Authors' elaboration based on findings of this report.

Note: MDG = Millennium Development Goals.

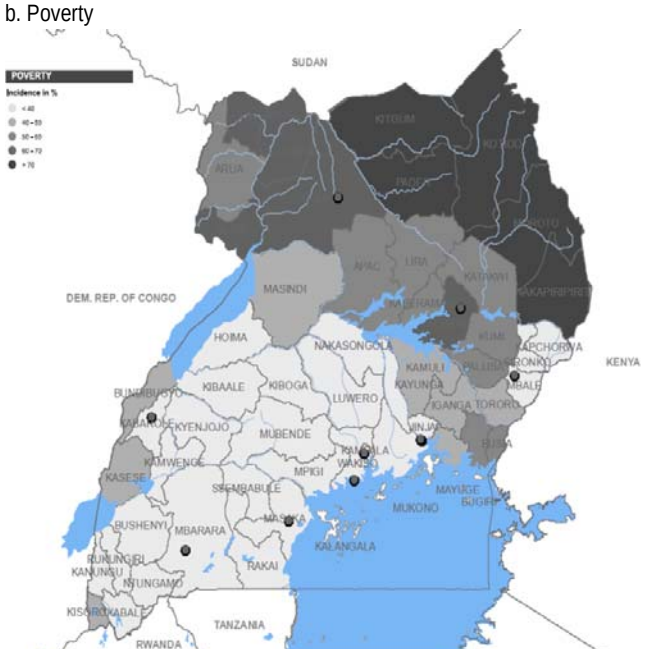
The infrastructure networks in Uganda more or less reflect economic development and population distributions. With regards to transport infrastructure, Uganda is integrated with the rest of East Africa through the Northern and Central Corridors. Northern road links to South Sudan have been of poor quality, but are improving rapidly due to new investments. Road infrastructure provides 90 percent of passenger and freight traffic and comprises of over 10,000 km of national roads, 27,500 km of district roads, and 4,800 km of urban roads. There is a marked absence of paved roads in the far northeast and southwest.

Figure 3. Uganda's poverty is heavily concentrated in the north of the country and population toward the eastern, central, and southern part of the country, 2005

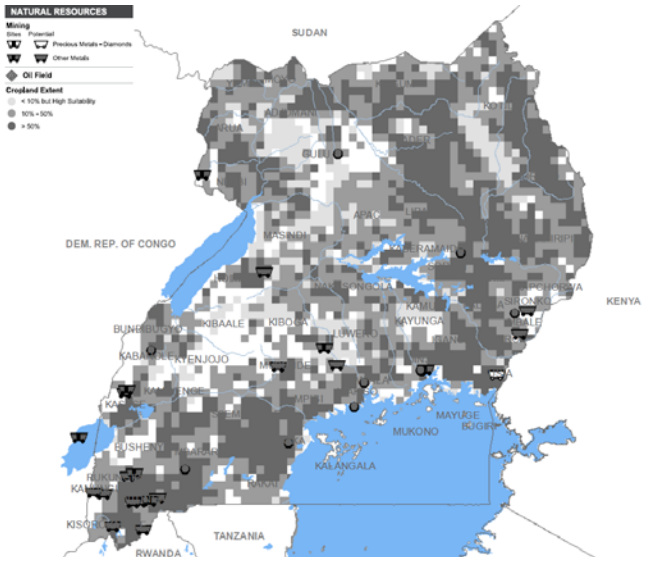
a. Population



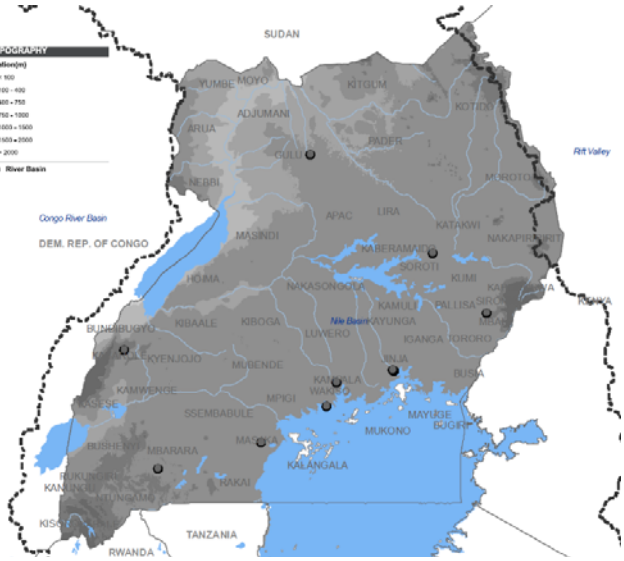
b. Poverty



c. Topography



d. Natural resources



Source: AICD Interactive Infrastructure Atlas for Uganda, downloadable from http://www.infrastructureafrica.org/library/doc/661/uganda-interactive-infrastructure-atlas

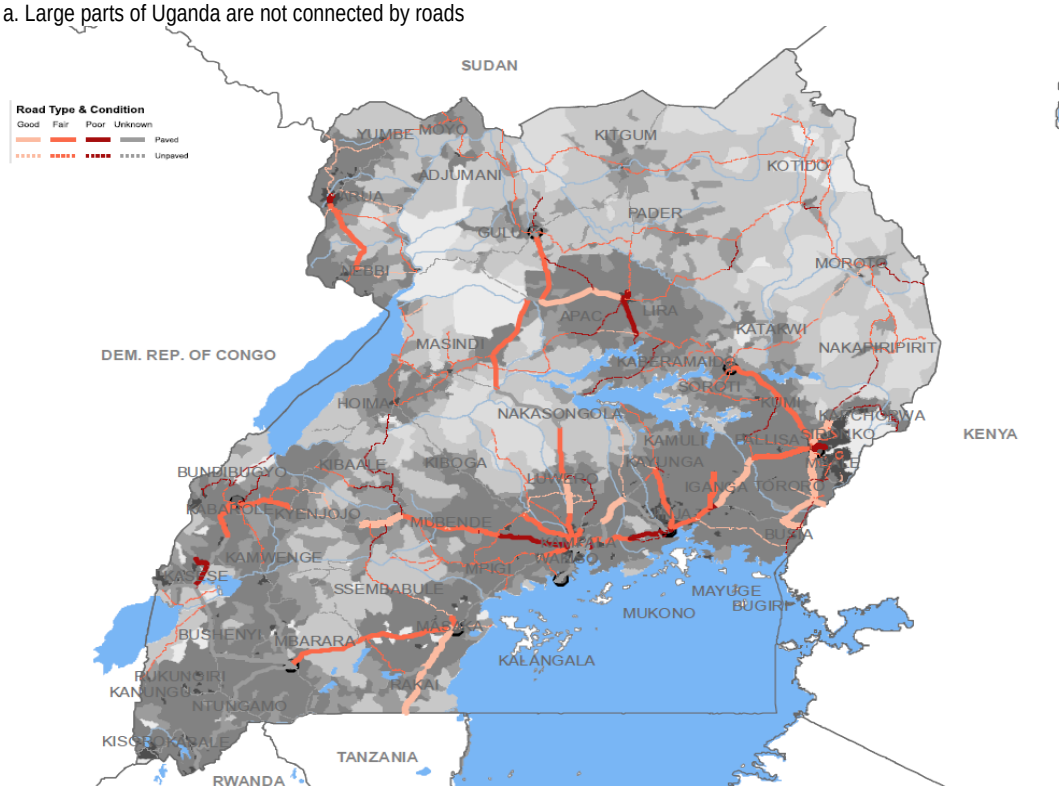
Uganda has an emerging national power grid, with regional interconnections planned. The power generation plants are mainly located around Lake Victoria, though a number of planned projects are underway both in the Lake Victoria area and beyond. The transmission grid covers a substantial portion of the country, but excludes the extreme northeast (figure 4b). As part of the East Africa Power Pool, Uganda is planning a number of cross-border interconnectors with neighboring Kenya, Rwanda, Sudan, and Tanzania.

Uganda has well developed ICT infrastructure. The country's global system for mobile communications (GSM) footprint is exceptionally expansive, covering virtually the entire national territory except for the extreme northeast. The national fiber-optic backbone is also quite extensive (figure 4d). Uganda, and the country is connected to the EASSy submarine cable via Kenya.

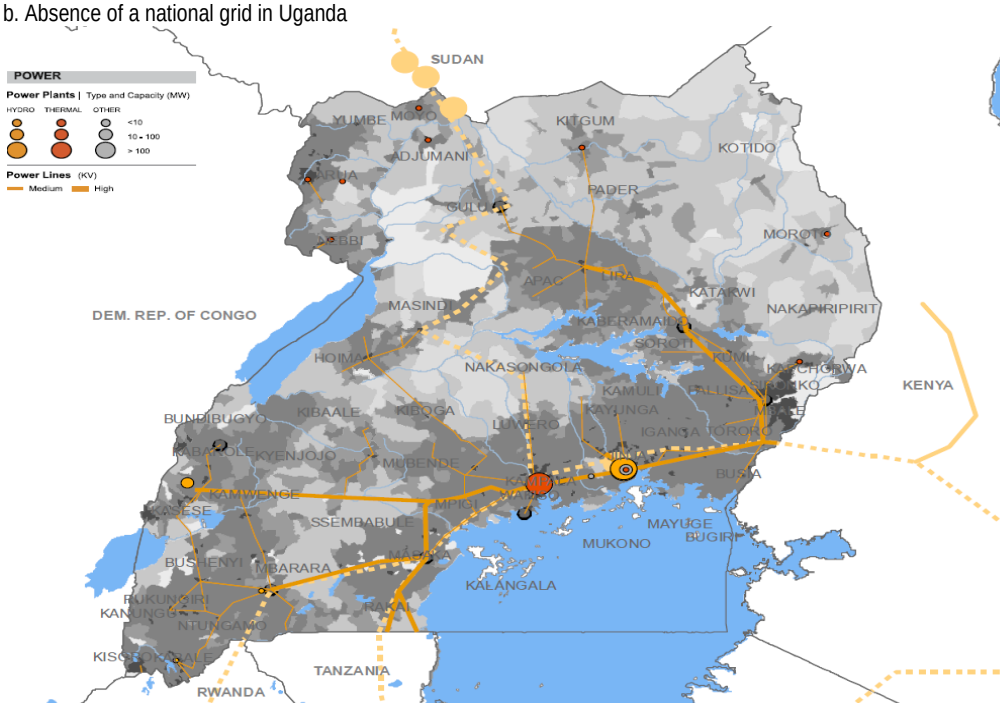
Uganda has a few areas where irrigation is being practiced. However, by and large, the country's agriculture is rainfed due to relatively high levels of precipitation.

Figure 4. Infrastructure in Uganda across most sectors is fragmented and in areas of high population density, 2005

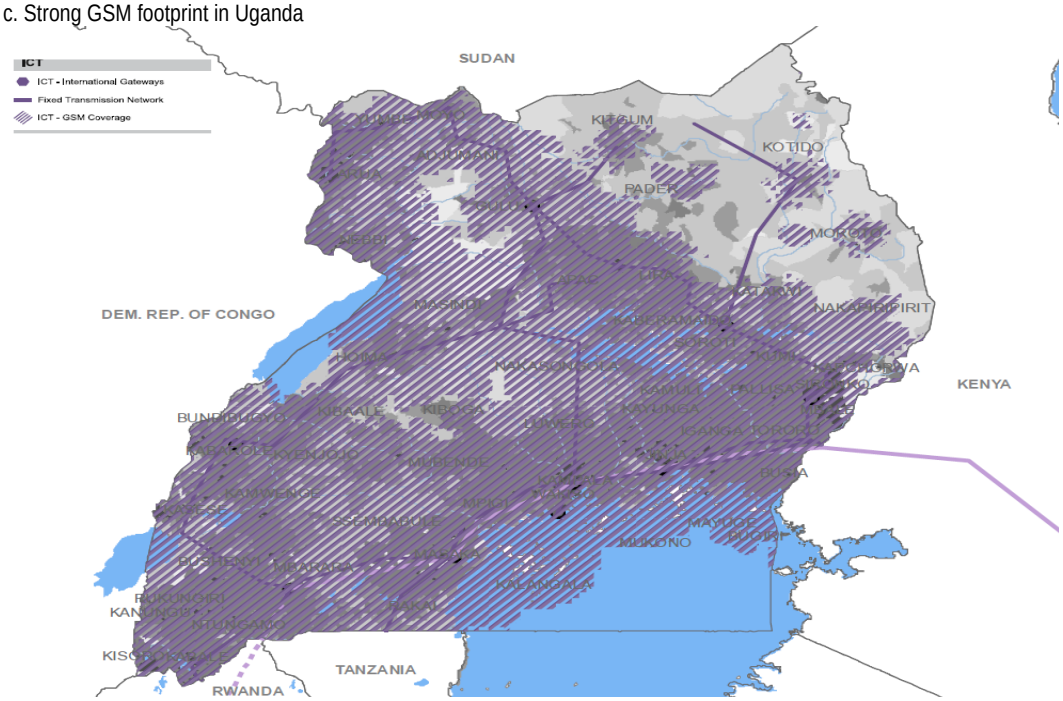
a. Large parts of Uganda are not connected by roads



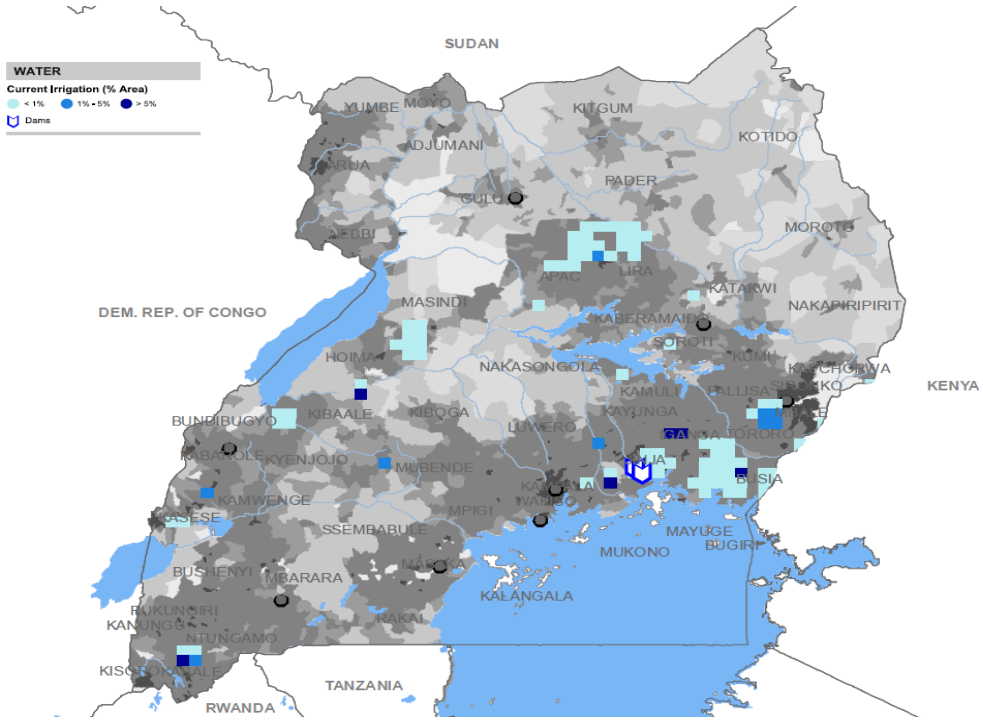
b. Absence of a national grid in Uganda



c. Strong GSM footprint in Uganda



d. Uganda is moderately endowed with water resources



Source: AICD Interactive Infrastructure Atlas for Uganda, downloadable from http://www.infrastructureafrica.org/library/doc/661/uganda-interactive-infrastructure-atlas
Note: GSM = global system for mobile communications.

Transport

Uganda's national and regional transport network in 2005 is illustrated in figure 5a. Traffic over that network in the same year is shown in figure 5.b.

Achievements

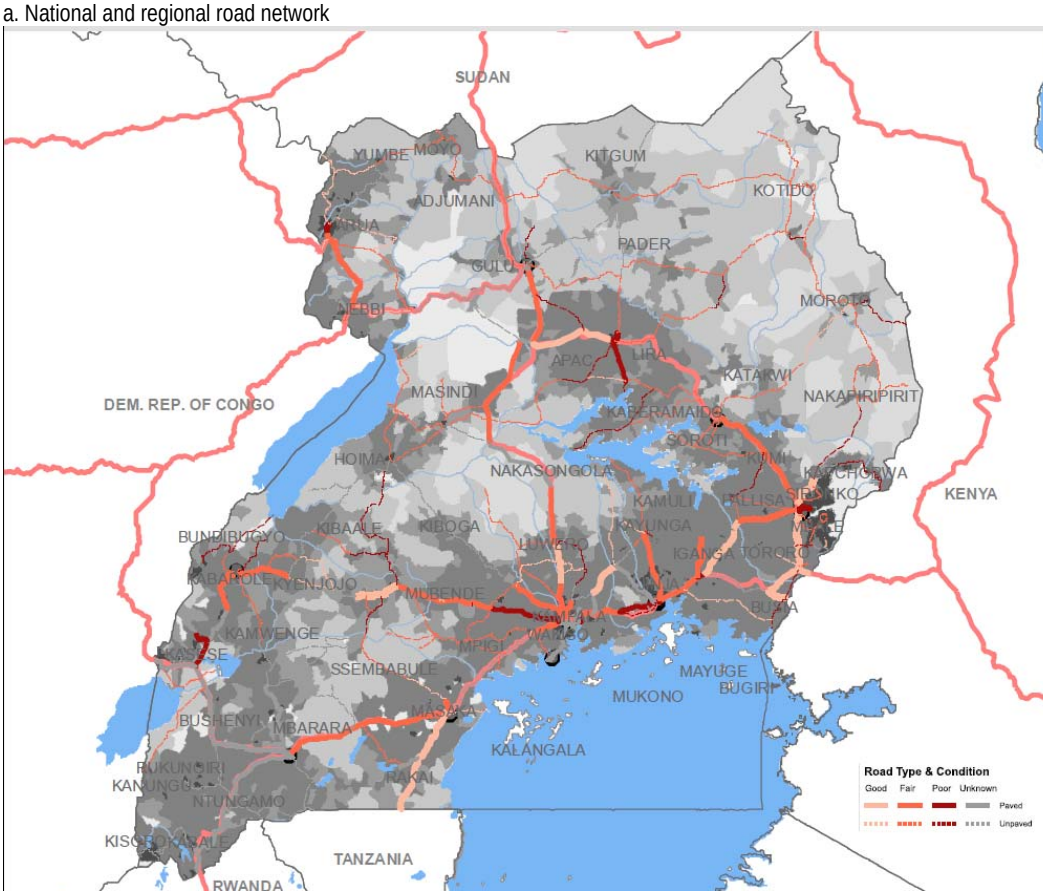
Two major trading arteries enable Uganda to better integrate with East Africa and obtain access to the sea via Mombasa and Dar es Salaam. The Northern Corridor provides international connectivity with Burundi, the Democratic Republic of Congo, Rwanda, South Sudan, and Kenya and connects Uganda to the coastal gateway of Mombasa. The Central Corridor provides connectivity with Burundi, Rwanda, Tanzania, and ultimately the alternative coastal gateway of Dar es Salaam. Of the two corridors, the Northern Corridor is the most frequently used for Ugandan freight, with Mombasa being the preferred gateway to the sea.

Over the last few years, the Uganda has made the Northern Corridor a strategic priority, making a concerted effort in the upkeep of certain segments of 650 km of the corridor within Uganda. Several sections of the road that were damaged are being rebuilt. Uganda has also received funds from the European Commission to upgrade the Northern Corridor. A feasibility study has been completed for the rehabilitation of the 150 km segment running from Mbarara to the Katuna border with Rwanda. The project will link 46 towns, trading centers, and villages (Nathan 2010).

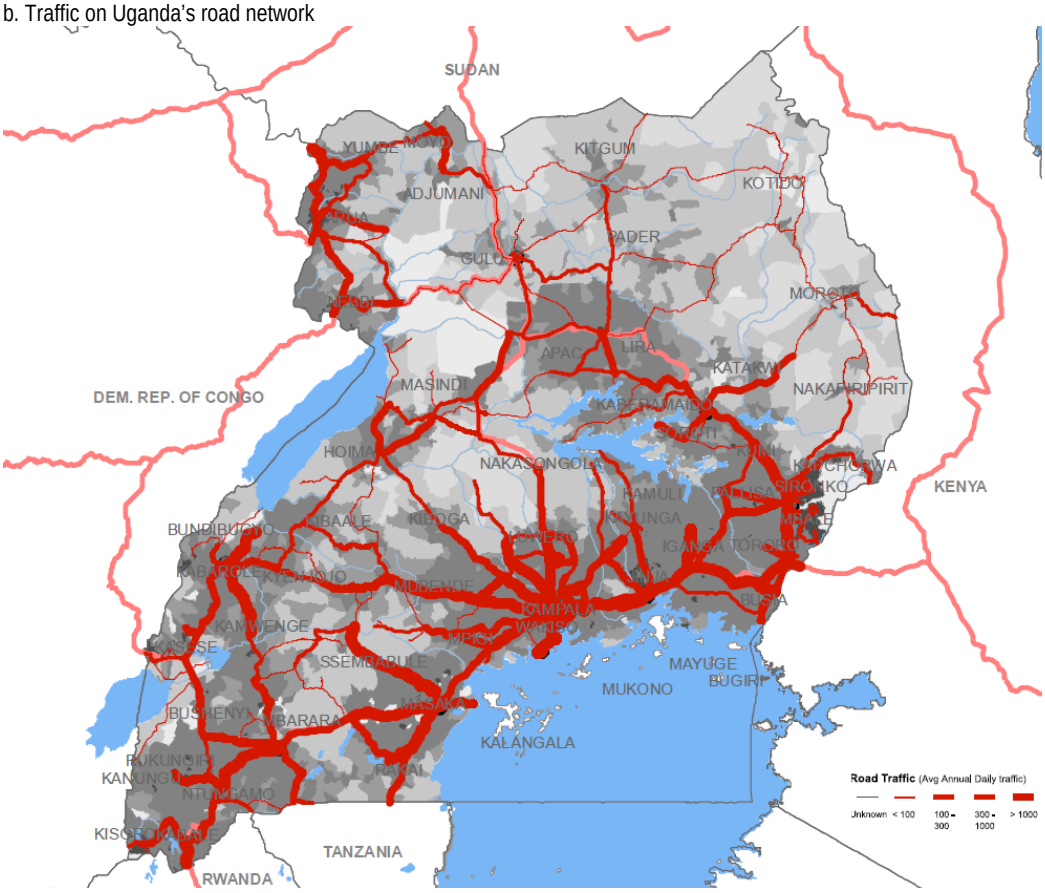
The trucking industry in Uganda and East Africa is relatively competitive and mature compared to that in West and central Africa. Freight transportation rates are determined by market forces rather than government regulations. The largest 20 professionalized trucking companies operate over 100 trucks each and serve 20 percent of East Africa's road freight market , with the remainder being serviced by smaller firms. This size distribution is comparable to Europe and North America, which ensures a significant degree of competition since market share is not too heavily conocentrated with any one player. The largest Kenyan company owns a fleet of 600 trucks. These large companies obtain loads from long-term direct contracting and reach a much higher mileage than companies in other parts of Africa. Their yearly mileage on routes to Kampala can reach more than 100,000 km, which is much higher than the average mileage of trucks operating along the main transport corridors in Central Africa notably Douala to N'Djamena and Bangui(at most 60,000 km per year). Transport service quality in East Africa, including Uganda, is higher than in central or West Africa, with larger and more modern fleets. On average, transport prices are lower, especially services to Uganda (Teravaninthorn and Raballand 2009).

Figure 5. National and regional transport network in Uganda, 2005

a. National and regional road network



b. Traffic on Uganda's road network



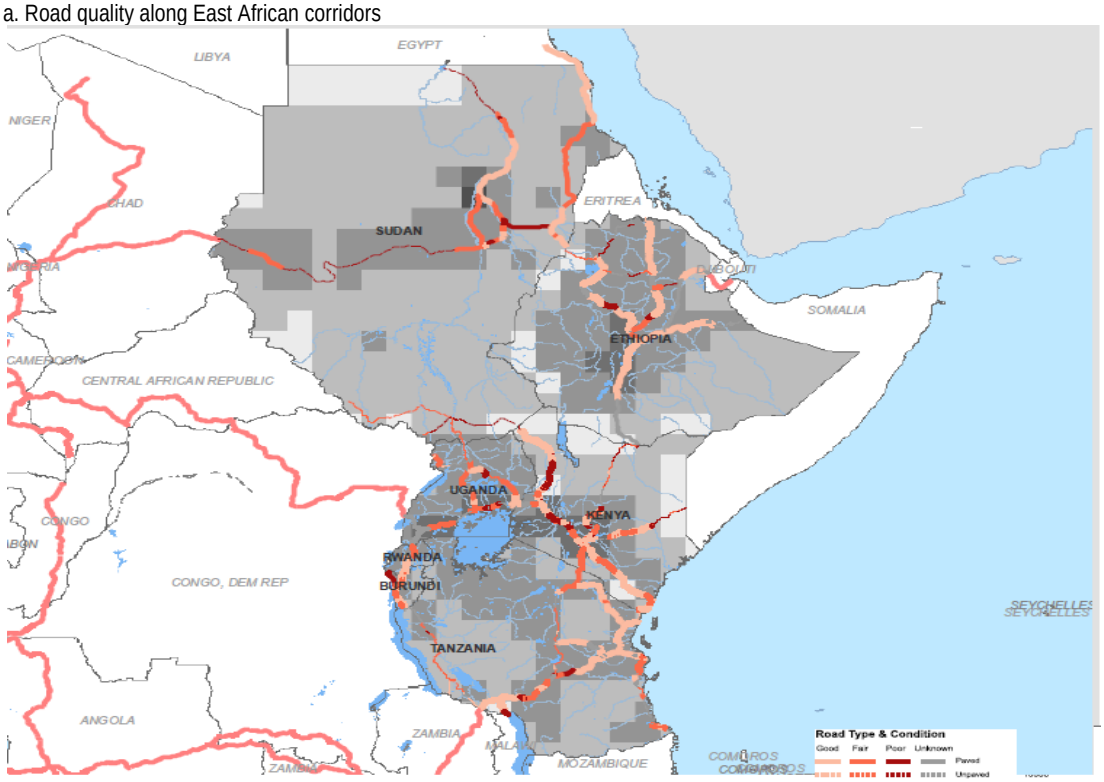
Source: AICD Interactive Infrastructure Atlas for Uganda, downloadable from http://www.infrastructureafrica.org/library/doc/661/uganda-interactive-infrastructure-atlas

Challenges

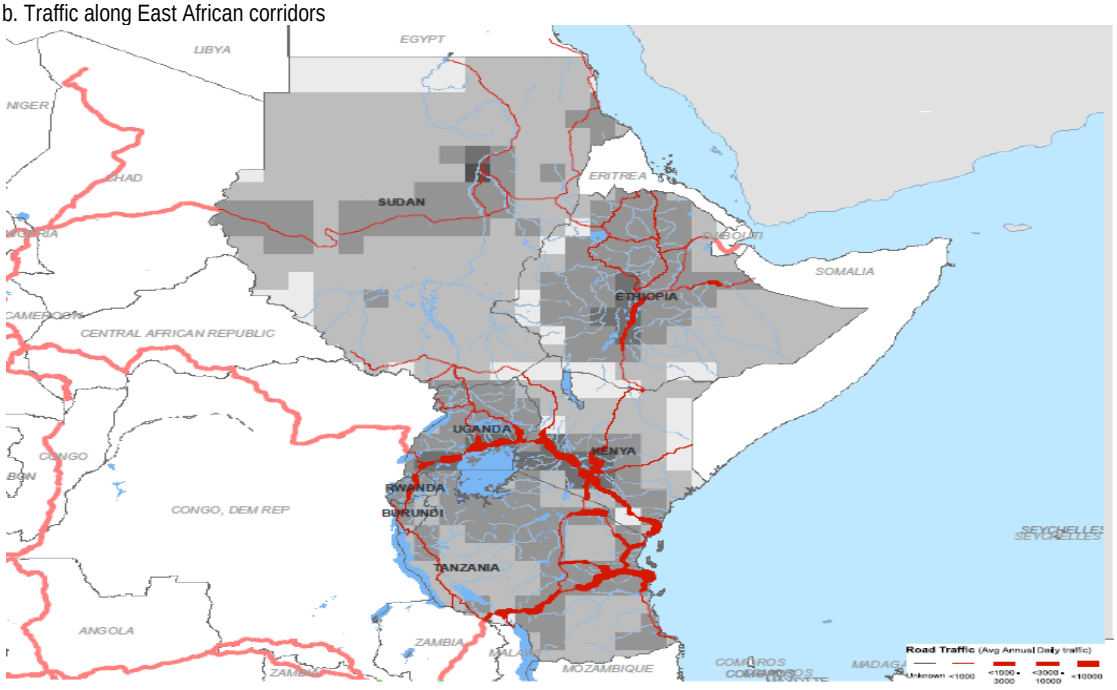
Sections of the international corridor in Uganda are unevenly developed. Uganda plays an important role as a transit hub in East Africa, connecting landlocked countries such as Burundi, Rwanda, and South Sudan with coastal gateways in Kenya and Tanzania. Traffic volumes are substantial along all of these transit routes, particularly on the Northern Corridor into Kenya. But the condition of road infrastructure varies significantly across corridors. On the Northern Corridor, around 90 percent of the section linking the border town of Malaba to Kampala is in good condition. The onward connection to the border with South Sudan is of extremely poor quality, but major efforts are now underway to upgrade this corridor. On the Central Corridor, linking through to Kigali, only around 40 percent of the Ugandan section is in good or fair condition (see figure 6 and table 2). Uganda has made connectivity with Kenya an important strategic priority because it provides the main trading route for Ugandan goods, but apparently places less emphasis on connectivity with other hinterland countries in East Africa.

Figure 6. Better roads connect Uganda with Kenya along the Northern Corridor than with Rwanda and the Central Corridor, 2005

a. Road quality along East African corridors



b. Traffic along East African corridors



Source: AICD Interactive Infrastructure Atlas for Uganda, downloadable from http://www.infrastructureafrica.org/library/doc/661/uganda-interactive-infrastructure-atlas

Table 2. Road conditions and traffic along portions of the Northern Corridor, 2005

	Condition				Type			Traffic bands (vehicles per day)			
Corridors	Good	Fair	Poor	Unknown	Paved	Unpaved	Unknown	>300	300–1,000	>1,000	Unknown
Mombasa to Nairobi to Kampala to Kigali to Bujumbura (Northern Corridor)	***43.8***	***34.7***	***9.9***	***11.6***	***94.6***	***0***	***5.4***	***1.2***	***10.3***	***80.2***	***8.3***
Rwanda	66.5	33.5	0	0	100	0	0	14.5	0	85.5	0
Uganda	6.9	34.6	10.1	48	77.5	0	22.5	*0*	21.8	78.2	0
Kenya	54.3	34.3	11.4	0	100	0	0	*0*	3.9	83.3	12.7
Burundi	45.2	4.2	0	0	100	0	0	0	70.3	25.6	4.2

Source: AICD analysis.

The cost of moving freight in Uganda varies between typical East African rates of $0.09 on the routes to the coast, and much higher rates of $0.20 on inland routes toward South Sudan. Three reasons underlie the expensive freight tariffs for northbound traffic. First, road quality is extremely poor, which escalates the costs of moving freight. Second, the region is just emerging from conflict, and moving freight in risky environments is typically expensive. Third, trucking companies operating this route are unable to pick-up return freight, returning empty from South Sudan to Uganda, thereby significantly increasing the cost of transport services. Fourth, there seem to be monopolistic market conditions, due to the operation of cartels and interference by local chiefs. This leads to distortion of market prices, which in turn further discourages entry by new operators.

Table 3. Benchmarking Uganda's regional network with African aggregates for regional corridors, 2005

	Road in good condition (%)	Implicit velocity (km per hour)	Freight tariff (US cents per tonne-km)
Western	72	6	8
Central	49	6.1	13
Eastern	82	8.1	7
Southern	100	11.6	5
Uganda	41	8.1–20	9–13

Source: Teravaninthorn and Raballand (2009) and World Bank staff estimates.

The speed of Uganda's road freight is close to the African average, but worse on northbound routes. Along most of Uganda's internal transport routes, surface transport moves at a pace of just under 20 km per hour (kmph), which is relatively good by African standards. But on the northbound routes into South Sudan the effective velocity drops to 8 kmph when delays are fully factored in (table 3). The slow effective velocity of freight in Uganda can be explained by lengthy customs clearance processes and administrative and border crossing delays. Based on estimates from 2008, East African trucking companies have indicated that their trucks have to wait between 1 and 2 days at Malaba, which is the busiest and most-congested border crossing between Kenya and Uganda. Evidence from 2010 suggests that this delay was reduced significantly, but still amounts to around 11 hours of wait time and another 4 hours to undertake all the customs clearance processes. Crossing the border from Uganda into Rwanda takes a similar amount of time, while crossing the Ugandan–South Sudanese border takes considerably longer, with delays ranging from 18 hours to 1 week (Nathan 2010; Yoshino 2011).

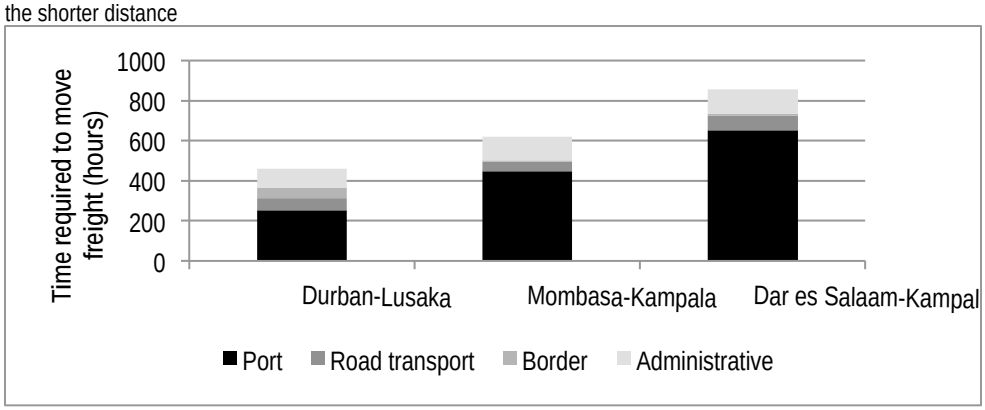
Uganda further suffers from congestion and lengthy delays at its two sea gateways of Mombasa and Dar es Salaam. Long dwell times and port congestion problems at Mombasa, and more so in Dar es Salaam, adversely impact Uganda, which is landlocked and reliant on regional ports as gateways to the sea. Between the two options for Uganda, Mombasa is the preferred port due to shorter distances and shorter dwell times.

Considering both port and road related costs and delays, it is possible to estimate the overall cost and delay associated with Uganda's two coastal gateways: Mombasa and Dar Es Salaam. These can be benchmarked against the North–South Corridor, which is southern Africa's preeminent trading route. The route from Lusaka to Durban performs significantly better than either of Uganda's sea corridors even though it is 1,000 km longer and involves two border crossings instead of the single one on each of Uganda's two routes to the sea**.** The total cost of moving freight from Kampala to Mombasa along Uganda's Northern Corridor costs twice as much per kilometer when compared to the cost of importing freight from Lusaka to Durban along the North–South Corridor, and the differential with respect to the Kampala to Dar es Salaam along Uganda's Central Corridor is even greater. The high costs can be attributed primarily to the high costs associated with the port as well as the relatively more expensive transport costs of moving along the Northern Corridor. Even with regards to costs, importing freight to Uganda via Dar es Salaam along the Central Corridor is far less competitive than the North-South Corridor (figure 7). Moreover, the journey from Kampala to Mombasa along the Northern Corridor takes 30 percent more time than the far longer journey from Lusaka to Durban, while the journey from Kampala to Dar Es Salaam along the Central Corridor takes twice as long as the Lusaka to Durban route. Port delays at Mombasa are 8 days longer than at the Port of Durban, while customs clearance processes in Uganda add an additional day to the total travel time.

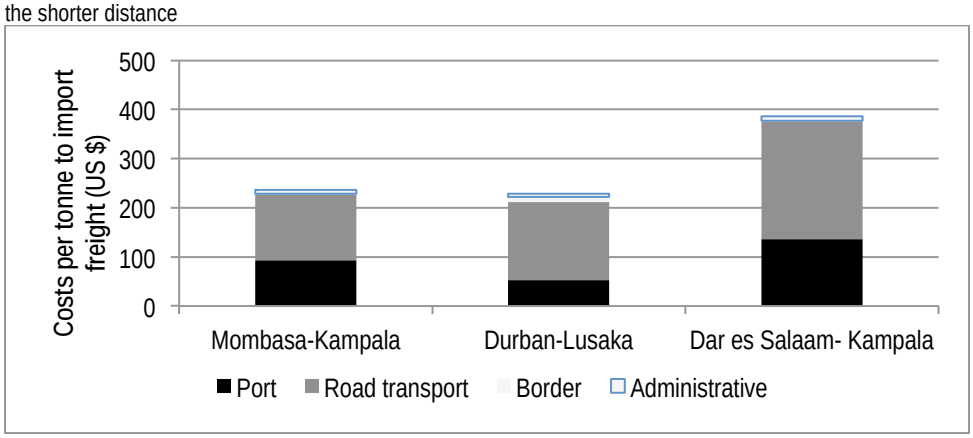
Rail service on the Uganda to Kenya route, which runs parallel to the Northern Corridor road, offers lower costs but delays can be significant. The Rift Valley Railway Company connects landlocked Uganda to the port of Mombasa providing an alternative to road freight along the Northern Corridor. A comparison of this parallel road and rail corridors suggests that freight tariffs on the northern corridor are between $0.07 and $0.09 per tonne-kilometer, slightly more than the Kenya-Uganda railway tariff ($0.05 cents per tonne-kilometer). Nevertheless, the railway often encounters additional delays due to disrepair or other service disruptions.

Figure 7. Time and cost of importing through alternative gateways involving Uganda, 2005

a. Moving freight from Mombasa to Kampala takes longer than moving imports from Durban to Lusaka, despite the shorter distance



b. Moving freight from Mombasa to Kampala costs more than moving imports from Durban to Lusaka, despite the shorter distance



Source: AICD calculations based on Nathan (2010); World Bank (2008); and AICD ports database.

Roads

Achievements

Road density in Uganda is rather high, with relatively high volumes of traffic. The classified road density at 365 km per 1000 km^2 is four times the density of an average low-income African country. The paved roads carry twice as much traffic as those of low-income African peers, and indeed as much as Africa's middle-income countries (table 4).

Uganda's roads are on average in better condition compared to several East African countries (figure 8). Around 87 percent of Ugandan roads are in good or fair condition compared to only 72 percent of the roads in its low-income peers (see table 4 and figure 8). And when compared to its East African peers, Uganda boasts some of the best quality roads—although Uganda's share of roads in good condition is relatively low, its share of roads in fair condition is exceptionally high.

Table 4. Benchmarking Uganda's roads, 2005

Indicator	Unit	Low-income, nonfragile countries	Uganda	Middle-income countries
Classified road network density	km/1,000 km² of land area	88	**360**	278
Total road network density [1]	km/1,000 km² of land area	132	**385**	318
GIS Rural accessibility	% of rural pop within 2 km from all-season road	25	**26**	31
Main road network condition [2]	% in good or fair condition	72	**87**	86
Rural road network condition [3]	% in good or fair condition	53	**39**	65
Classified paved road traffic	AADT	1,131	**2,460**	2,451
Classified unpaved road traffic	AADT	57	54	107
Primary network overengineering	% of primary network paved with 300 AADT or less	30	12	18
Primary network underengineering	% of primary network unpaved with 300 AADT or more	13	**26**	20
Perceived transport quality [4]	% firms identifying transport as major business constraint	28	22	18

Source: AICD Road Sector Database on 40 Sub-Saharan African countries.

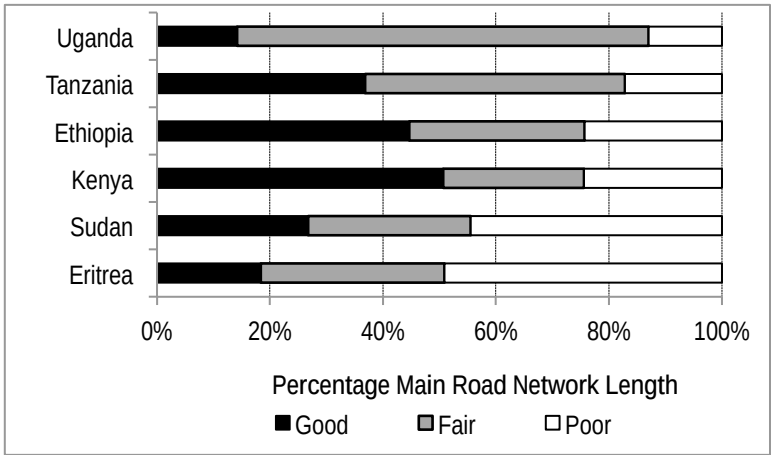
[1] Total network includes the classified and estimates of unclassified and urban networks.

[2] Main network for most countries is defined as result of adding the primary and secondary networks. Uganda is only primary.

[3] Rural network is generally defined as the tertiary network and does not include the unclassified roads.

[4] Source: World Bank—IFC Enterprise Surveys on 32 Sub-Saharan African countries.

Figure 8. Main road network conditions in East Sub-Saharan Africa, 2005



Source: AICD Road Sector Database on Southern Sub-Saharan African countries.

A number of recent efforts have aimed at strengthening road sector institutions. The Ministry of Works and Transport, which is responsible for policy formulation, leads and periodically formulates and updates the government's National Transport Policy and Strategy (NTPS), which includes a Road Sector Development Program (RSDP). Following a long-term transitional arrangement that created the Road Agency in Formation Unit (RAFU), which is mostly externally funded, the government established the Uganda National Roads Authority (UNRA), which become operational in 2008. The UNRA is responsible for executing the road development and maintenance plans of national roads as well as projects financed by donors and development agencies. The Uganda Road Fund (URF) was legally established in 2008 as a Second Generation Road Fund and become operational only in 2010. The URF has private participation in its board and has been given the mandate to provide funding for maintenance on all roads. The legislation makes provision for road user charges including fuel levy, license fees, and others. However, the only source of funds applied to date have been appropriations by parliament from Ministry of Finance consolidated funds. This contravenes

the principle of the URF and does not satisfy the intention of the Act. The finances applied to maintenance of the roads are not clearly related to road usage but are decided arbitrarily within the normal budget process.

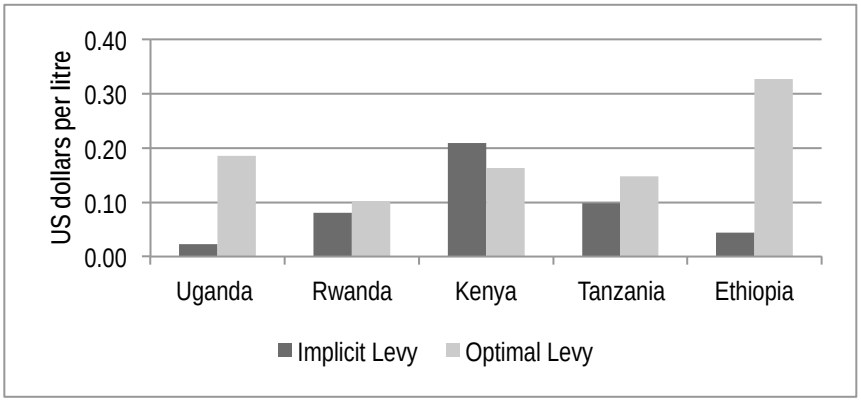
Challenges

Over half the district (that is, rural or feeder) roads are in poor condition. District roads connect rural areas to markets, health centers, educational institutions, administrative centers, and other services and are the responsibility of the district governments. In 2008, 54 percent of the district roads were in poor condition (World Bank 2009b). Despite the higher than average road density in Uganda, the share of the population living within 2 km of an all-season road is no better than for other low-income African countries. Further while over half the rural roads in other low-income African countries are in good or fair condition, barely 40 percent of the rural roads in Uganda are in good or fair condition, highlighting the low accessibility of the rural areas.

The road network in Uganda is highly fragmented. The main road networks originate from urban centers and connect surrounding areas. But connectivity between urban centers is limited—roads are either nonexistent or in poor condition. And a large portion of Uganda's north and western central region, which are less dense in terms of population and have high incidence of poverty, are limited road connectivity (see figure 5a).

Uganda is not devoting adequate resources to routine and periodic maintenance of the main infrastructure networks. Many countries in Africa have introduced road user charges—in the form of fuel levies—as a mechanism for funding road maintenance. Fuel levies in East Africa range widely from $0.03 to $0.20 per liter. Only in Kenya, however, is the fuel levy high enough to make a significant contribution to road maintenance funding. In Uganda, the optimal fuel levy is estimated to be around $0.18 per liter of fuel, while current spending levels on road maintenance are as low as just a few cents per liter of fuel. In fact, Uganda is one of the countries in Africa that has the largest divergence between actual and required spending on road maintenance (figure 9).

Figure 9. Optimal and existing fuel levies in Uganda and selected other countries, 2005



Source: AICD calculations.

Lack of safety on Ugandan roads is reaching alarming proportions. With rapidly growing motorization but only slightly improved road conditions, road accident fatalities in Uganda have increased dramatically over the last few years. The number of accidents has been growing at a rate of 6–7 percent per year, translating into a fatality rate of 81 per 100,000, double what is observed in Africa on average (World Bank 2009).

Railways

Achievements

Uganda boasts one of the few bi-national railway systems in Africa, connecting the country with Kenya. The railway has been developed as an integrated operation between the two countries based on a partnership between the Ugandan Railway Company (URC) and Kenya Railway (KRC). This configuration smoothes the passage of goods across national borders and avoids the lengthy delays otherwise associated with switching of locomotives as freight is shifted from one national network to another.

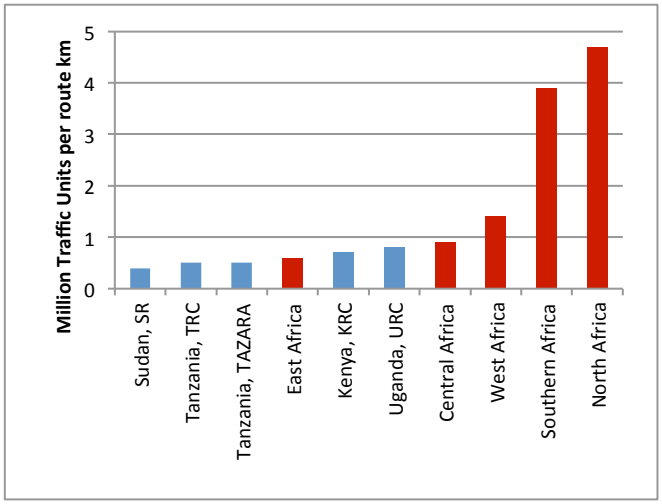
The URC network consists of four lines totaling 1,350 km of meter-gauge line, of which 259 km are currently being used under the binational concession with Kenya. The most heavily used URC link is the connection from Kampala to Malaba and the link between Kampala and the lake (Port Bell).

Challenges

Uganda's railways recorded relatively high traffic by East African standards, though low in absolute terms. (figure 10). Uganda's railway has been recording 0.8 million traffic units annually, above the East African regional average of 0.6 million, and well ahead of rail networks in Sudan and Tanzania. Nevertheless, traffic flows on East African railways are low relative to other regions of Africa, which are themselves lightly used by global standards.

Poor operational performance has made Uganda's railways uncompetitive relative to roads. Uganda's railways have recorded low labor productivity, locomotive productivity, and wagon productivity (table 5). The recent concession of the railways of both Kenya and Uganda did not lead to immediate improvements in the performance of the system, with efficiency impeded by obsolete equipment, lack of adequate maintenance, and lack of spare parts.

Figure 10. Uganda's railways, like those of the rest of East Africa, are lightly used, 2005



Source: AICD railways database 2009.

Competition from the road sector has further reduced the usage of Uganda's railways. The lack of a strong marketing effort in the face of competition from the road sector has contributed to declining rail freight volumes. This was compounded by the liberalization of coffee transportation in 1990, removing the government mandate that the industry use rail transportation (World Bank 2005).

Table 5. Performance of Ugandan railways, 2005

	Labor productivity	Carriage productivity	Locomotive productivity	Wagon productivity	Freight yield	Passenger yield
Djibouti, CDE					12.5	3.1
Ethiopia/Djibouti, CDE	71	3,037	11	156		
Kenya, KRC (RVRC)	203	1,159	24	218	3.8	0.6
Sudan, Sudan	77	329	9	225		
Tanzania, TRC	259	3,264	25	583	4	1.6
Tanzania, TAZARA	352	2,770	13	551	3	1.1
Uganda, URC (RVRC)	156		9	144		
Rail concessions	350	2,945	23	491	5	2

Source: AICD railways database.

Note: Labor productivity = '000s traffic units per employee; locomotive productivity = millions of traffic units per locomotive; carriage productivity = '000s passenger-km per carriage; wagon productivity = '000s net tonne-km per wagon.

Air transport

Air transport indicators for Uganda and selected other countries are compared in table 6.

Table 6. Benchmarking air transport indicators for Uganda and selected other countries, 2007[2]

Country	Uganda	Tanzania	Rwanda	Burundi	Kenya	South Africa
Traffic						
Domestic seats (seats per year)	70,980	1,871,255	n.a.	n.a.	2,093,416	31,767,537
Seats for international travel within Africa (seats per year)	978,337	1,237,153	467,203	263,363	3,144,782	6,314,557
Seats for intercontinental travel (seats per year)	493,740	585,763	18,304	6,864	2,755,352	7,707,063
Seats available per capita	0.050	0.093	0.050	0.032	0.210	0.954
Herfindahl-Hirschmann Index—air transport market (%)	17.19	9.75	32.63	28.42	39.47	16.66
Quality						
Percent of seat-km in newer aircraft	73.2.	79.3	95.8	87.3	80.2	83.8
Percent of seat-km in medium or smaller aircraft	27.9	48.6	72.0	64.5	20.8	32.8
Percent of carriers passing IATA/IOSA Audit	0	33	0	0	11.1	33.3
FAA/IASA Audit Status	No audit	No audit	No audit	0	Failed	Passed

Source: Bofinger 2009. Derived from AICD national database (www.infrastructureafrica.org/aicd/tools/data).

n.a. = Not applicable.

Note: The Herfindhal-Hirschmann Index (HHI) is a commonly accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. A HHI of 100 indicates the market is a monopoly; the lower the HHI, the more diluted the market power exerted by one company/agent.

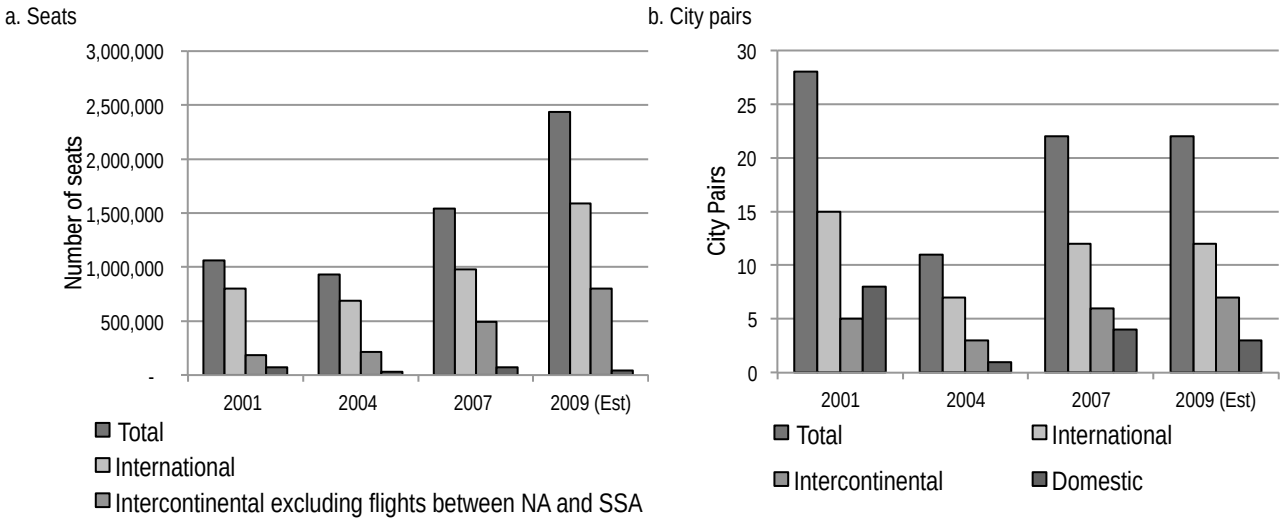
FAA = U.S. Federal Aviation Administration; IASA = International Aviation Safety Assessment; IATA = International Air Transport Association; IOSA = IATA International Safety Audit.

[2] All data as of 2007 based on estimations and computations of scheduled advertised seats, as published by the Diio SRS Analyzer. This captures 98 percent of worldwide traffic, but a smaller percentage of African traffic.

Achievements

Uganda's efforts to liberalize the air transport market have increased international air traffic and boosted sector performance. In 2001, Uganda shut down its national flag carrier and opened up the market for liberalized traffic. After the initial drop in capacity, in 2007 a new carrier—Air Uganda—was formed with financing from the Aga Khan Foundation. Traffic has grown significantly from a low of just under 1 million seats per year in 2004 to around 2.5 million seats estimated for 2009 (figure 11a). Connectivity has also recovered from around 10 city pairs in 2004 to some 20 city pairs estimated for 2009 (figure 11b). Uganda's policy decisions have led to a healthy increase in international traffic volume, and present a case study on the positive impact of liberalization. Not only are outside carriers willing to service the country, outside investors are also willing to establish a regional carrier registered in Uganda. Since Uganda, like its neighbors Rwanda and Burundi, is a relatively small country, domestic service is minimal.

Figure 11. Evolution of seats and city pairs in Uganda, 2001–09



Source: Bofinger 2009.Derived from AICD national database (www.infrastructureafrica.org/aicd/tools/data).
Note: As reported to international reservation systems.
NA = North Africa; SSA = Sub-Saharan Africa.

Uganda's airport infrastructure is also in reasonably good shape. As part of the Commonwealth meetings of heads of states in Kampala in 2007, a modern radar system was purchased for air traffic control, updating a virtually uncontrolled airport to more modern surveillance.

Uganda has benefited significantly from the increased air transport activity in East Africa, which is served by some of the leading air carriers in the continent. Uganda has benefited from its proximity to Kenya and Ethiopia and the strong regional airlines and regional hubs that have emerged in those countries. An origin-destination matrix of all flights in a week in East Africa shows that Uganda, after Tanzania, has the highest number of flights per week from Kenya and Ethiopia (figure 12). Uganda also benefits from frequent services provided by other international carriers such as Emirates.

Figure 12. All flights in one week in East Africa, 2007

		Destination						
		Burundi	***Ethiopia***	***Kenya***	Rwanda	Sudan	Tanzania	Uganda
Origin	Burundi		*7*	*8*	20			7
	Ethiopia	*7*		*11*	*7*	*15*	*21*	*14*
	Kenya	*7*	*11*		*15*	*34*	*87*	*39*
	Rwanda	20	*7*	*14*			1	11
	Sudan		*12*	*17*				4
	Tanzania		*7*	*48*				6
	Uganda	7	*14*	*39*	11	12	16	

Source: Bofinger 2009.

Challenges

Connectivity with Rwanda and to some extent Burundi, however, remains limited. Not only does Uganda have fewer flights to Rwanda and Burundi than to any other destination in East Africa, but the convenience and speed of air travel on these flights is significantly worse than on other routes due in part to long layovers on multi-stop flights (figure 13).

Resource constraints in Uganda pose a threat to air safety. Challenges are not due to the lack of professionalism in the Ugandan Civil Aviation Authority, which is dedicated to oversight, correct policy, and a high standard of service, but rather due to the size of the country and the limited resources available. This has led to a number of safety deficiencies that have been highlighted in the 2009 International Civil Aviation Organization (ICAO) audit. Some of the issues found, such as poor search and rescue capabilities, as well as weak accident investigations and resources for flight checks and ramp inspections, are regional in nature, and will be addressed in due course with the recent formation of the East African Civil Aviation Authority, an entity set up in the EAC with support from, among others, the U.S. Safe Skies Over Africa Program.

Figure 13. Slow speed of service from Uganda to Rwanda and Burundi (kilometers per hour), 2007

		Destination						
		Burundi	Ethiopia	Kenya	Rwanda	Sudan	Tanzania	Uganda
Origin	Burundi		460	410	296			512
	Ethiopia	460		582	620	497	557	610
	Kenya	350	582		363	298	275	436
	Rwanda	*16*	620	305			590	***73***
	Sudan		572	330				513
	Tanzania		662	*193*				661
	Uganda	256	610	440	*176*	332	307	

Source: Bofinger 2009.

Water resources

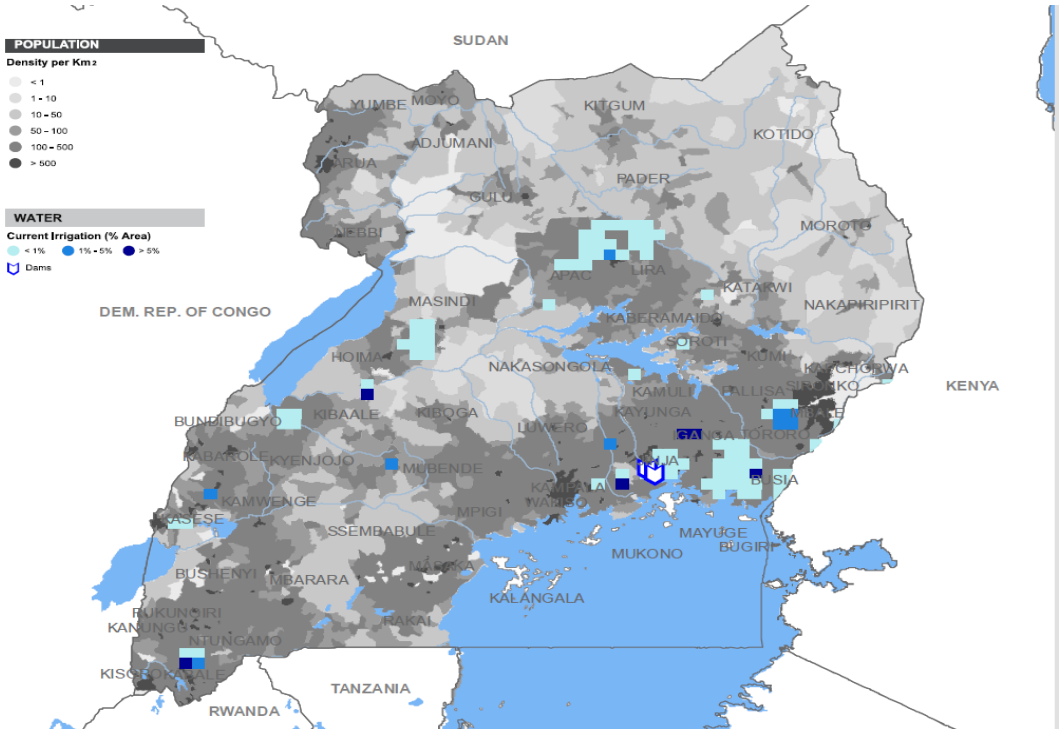
A significant share of Uganda's territory is covered by fresh water lakes. Around 42,500 km^2 (or 18 percent of the area) is covered by water in Uganda, due to the presence of major lakes such as Lake Victoria and Lake Albert (figure 14). The country has 66 km^3 of renewable water resources per year, equivalent to about 2,800 cubic meters (m^3) per capita. The Nile basin is the most important river basin in

the country. Rainfall ranges between 900 millimeters (mm) to 2,000 mm per year, depending on the region and the season of the year.

Challenges

Economic growth, population explosion, and growing urbanization are putting serious pressure on water resources. The annual population growth at 3.3 percent puts stress on water resources, both in the context of rapid urbanization and growing demand for food and associated irrigation needs. There is a need for clearly defined water rights to manage the competing needs of agriculture, water supply and industrialization.

Figure 14. Water resources in Uganda, 2005



Source: AICD Interactive Infrastructure Atlas for Uganda, downloadable from http://www.infrastructureafrica.org/library/doc/661/uganda-interactive-infrastructure-atlas

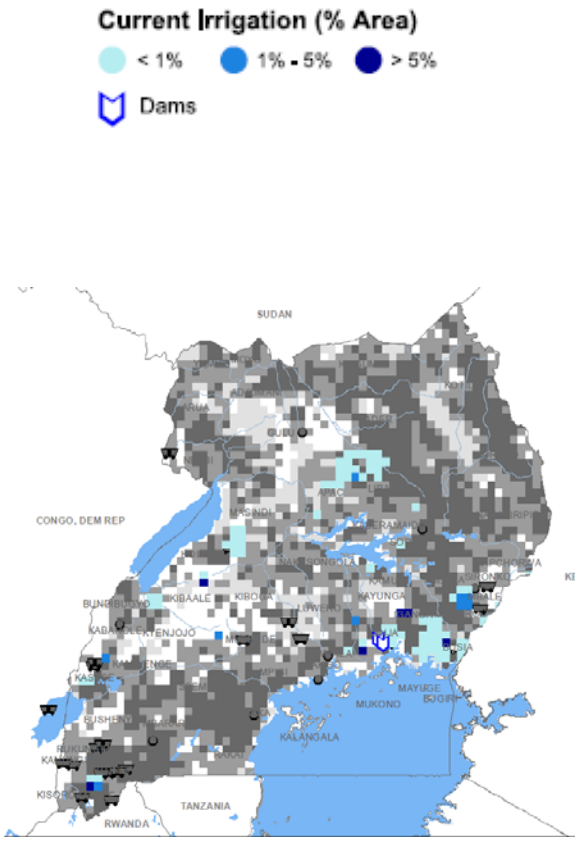
Irrigation

Achievements

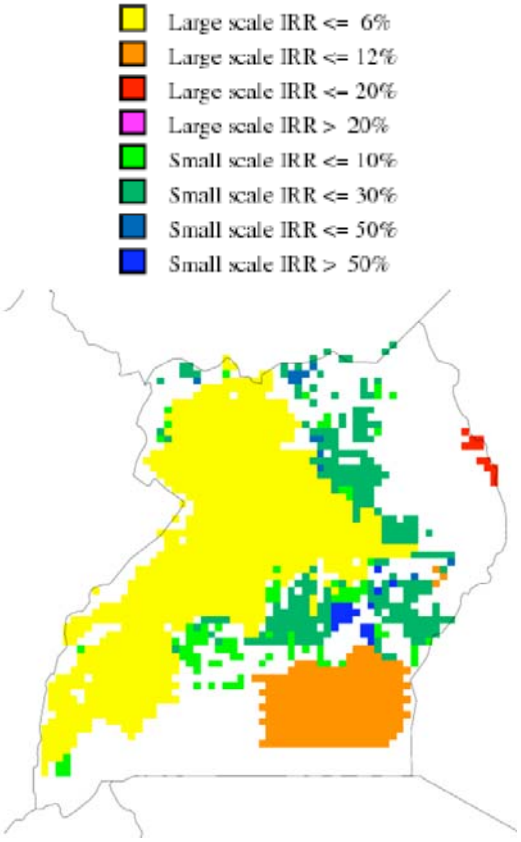
Irrigation has been developed in areas of high agricultural yield. A very high percentage of Uganda's land area is arable and being used for agriculture, albeit at a low level of intensity. In contrast to many other African countries, there are only small pockets of high value agricultural land that have not yet been tapped (figure 15a). There are significant swathes of land where some degree of irrigation is practiced along the northern shores of Lake Victoria as well as in a northwesterly arc in more outlying areas. But even in these irrigated areas, less than 1 percent of the land is actually under irrigation.

Figure 15. Uganda irrigation sector, 2005

a. Current irrigation area



b. Potential (baseline scenario)



Source: Map on current area: AICD Interactive Infrastructure Atlas for Niger (www.infrastructureafrica.org). Map on irrigation potential: You 2008.

Note: Baseline scenario was calculated assuming investment cost of $3,000 per hectare, a canal maintenance and water-delivery cost of 1¢ per cubic meter, on-farm annual operation and maintenance costs of $30 per hectare, and a discount rate of 12 percent.

IRR = internal rate of return.

Table 7. Uganda's irrigation potential, 2005

	Large-scale			Small-scale			Total		
	Investment	IRR	Area increase	Investment	IRR	Area increase	Investment	IRR	Area increase
Cutoff (%)	$ million	%	hectares	$ million	%	hectares	$ million	%	hectares
0	1,035	2.4	530,522	3203	32.0	619,916	4239	18.4	1,150,438
6	36	6.9	18,498	2926	37.0	566,165	2962	36.0	584,663
12	0	0.0	0	2300	45.0	445,041	2300	45.0	445,041
24	0	0.0	0	687	72.0	133,009	687	72.0	133,009

Source: Derived from You and others (2009).

Note: Water for irrigation can be collected in two ways: through large, dam-based schemes or through small projects based on the collection of run-off from rainfall. The investment costs of large-scale irrigation development reflect only irrigation-specific infrastructure, such as distribution canals and on-farm system development. The potential for small-scale irrigation is assessed not only on the basis of agroecological conditions, but also in terms of market access, since irrigation is typically viable only if the increased yields can be readily marketed. The unit cost for large scale projects is set at USD3000/ha and for small scale projects at USD2000/ha.

Challenges

Uganda can maximize its potential and achieve rates of return of at least 12 percent by developing small scale irrigation projects in a relatively small area, but at a high initial cost. Across most of Uganda's territory, which covers over a million hectares in all, either large scale or small scale irrigation activity is economically viable (figure 15b; table 7). But if attention is limited to higher return irrigation schemes with internal rates of returns of at least 12 percent, the viable area shrinks to just under half a million hectares, but the average rate of return shoots up to 45 percent. This would be entirely composed of small-scale irrigation schemes on the eastern side of the country, as none of the large-scale irrigation schemes are capable of delivering returns above this threshold. However, the total investments needed to develop this area amount to a daunting $2.3 billion (table 7).

Water supply and sanitation

Achievements

Developments in the water and sanitation sector have curtailed use of untreated surface water and reduced practices of open defecation. Use of untreated surface water halved between 1995 and 2006, falling from 28 percent to 13 percent. In fact, reliance on untreated surface water in Uganda is one-third of what is observed in low-income countries in Africa. Similar progress was recorded in the sanitation sector. The practice of open defecation decreased from 20 percent to 12 percent between 1995 and 2006, and its rate of prevalence in Uganda is now only one-third of the average for other low-income countries and below the average of middle-income countries (table 8). Most of the decrease in use of untreated surface water and reduction in open defecation was achieved between 1995 and 2001, although the rate of improvement has subsequently declined.

The reduced reliance on untreated surface water and reduced prevalence of open defecation is due primarily to an increased availability of intermediate water and sanitation options. In the case of water, there has been a rapid expansion in the use of stand posts and, in particular, wells and boreholes (even if only a fraction of these can be considered to supply safe drinking water). In the case of sanitation, there has been steady growth in access to both traditional and improved latrines. Indeed, as of 2006, the coverage of improved latrines at 69 percent is seven times greater than the average low-income country in Africa (table 8). Due in part to relatively low rates of urbanization, there has been little if any increase in the coverage of higher end solutions, such as piped water and flush toilets; Uganda has achieved its noteworthy improvements in water and sanitation access by pragmatically focusing on intermediate lower cost solutions.

Table 8. Benchmarking water and sanitation indicators in Uganda, 1995–2006

	Unit	Low-income countries	Uganda			Middle-income countries
		Mid-2000s	1995	2001	2006	Mid-2000s
Access to piped water	% pop	9.3	3.0	2.2	3.2	61.1
Access to stand posts	% pop	17.1	4.6	7.6	9.8	22.1
Access to wells/boreholes	% pop	39.3	64.2	75.5	73.5	4.8
Access to surface water	% pop	34.2	28.0	14.9	13.4	10.9
Access to flush toilets	% pop	4.7	1.4	1.5	1.1	47.7
Access to improved latrines	% pop	18.3	64.9	67.0	69.0	33.7
Access to traditional latrines	% pop	38.5	13.2	13.4	17.5	6.9
Open defecation	% pop	38.3	20.3	17.8	12.0	11.0
		Mid-2000s	1996	2001	2009	Mid-2000s
Domestic water consumption	liter/capita/day	51	41.0	39.1	41.3	196
Revenue collection	% of total billings	94	47.9	51.9	99.0	99
Distribution losses	% of production	35	64.5	47.5	35.8	29
Cost recovery	% total costs	89	153	133	92	86
Operating cost recovery	% operating costs	125	209	240	138	121
Labor productivity	Connections per employee	176	45.1	91.4	148.9	203
Hidden costs	% of total revenues	163	176	149	43	140

U.S. cents per m^3	Uganda 2001	Uganda 2006	Scarce water resources	Other developing regions
Residential tariff	47	66	60	3–60
Nonresidential tariff	80	104	121	

Source: Demographic and Health Survey and AICD water and sanitation utilities database (www.infrastructureafrica.org/aicd/tools/data). Access figures from Demographic and Health Surveys (1995, 2001, and 2006).

These improvements in access to improved water and sanitation services have propelled Uganda toward meeting the MDGs. Access to improved water increased from 48 percent to 66 percent in of the population between 1995 and 2006, while access to improved sanitation rose from 66 percent to 70 percent over the same period. As a result, Uganda has already met the MDG of 65 percent for improved sanitation, and is close to reaching goal of 72 percent for improved water.

The performance of the urban water sector has been boosted by the remarkable improvements in the performance of the National Water and Sewerage Corporation (NWSC). The NWSC provides water supply and sewerage services in the 22 largest urban centers covering only 10 percent of the population in all. The improved performance is attributable to increases in revenue collection and a reduction in distribution losses. Revenue collection doubled from 48 percent of the bills in 1996 to 99 percent of the bills in 2009 (table 9). These rates exceed those of an average utility in low-income countries and are equivalent to the rates for utilities in middle-income countries in Africa (table 8). Distributional losses also reduced significantly from 65 percent of production in 1996 to 36 percent in 2009.

Box 1. Understanding the differences between the JMP and government data

The AICD uses the Joint Monitoring Data (JMP) coverage statistics as the main source of access data on water supply and sanitation, and process under a standardize methodology to allow cross-country comparisons. These data might differ from that reported by governments. The JMP data are based on household surveys and therefore reported by users of the services, the government data is based on utility reports. This implies that there is a time lag between output data (provider) and outcome data (users). Moreover, household surveys capture clandestine use of water services, which are not conveyed in utility data. Other underlying factors explaining potential differences are the definition of what technologies constitute improved access to water supply and sanitation; and, the JMP's use of several household surveys vis-à-vis the use of a single data point by several governments. Therefore, the conclusion on progress on MDGs might differ according to the data source used.

Source: Adapted from AMCOW (2010).

Despite the improvements, however, distribution losses at the NWSC as of 2009 were 16 percentage points higher than the benchmark for a well-performing water supply utility in Africa (table 9). The NWSC has also recorded impressive progress in labor productivity, with connections per employee more than tripling from 45 connections per employee in 1996 to 148 connections per employees in 2009; this still falls short of the benchmark of 200 connections per employee for a well-run utility in Africa, however. In 2005 a free connection policy was introduced to allow the poorest customers to access utility water. Since then the number of the NWSC's connections has almost doubled, rising from 123,046 connections in 2005 to 225,932 in 2009. Nevertheless, cost recovery is still a substantial challenge for the NWSC. Costs have increased substantially in recent years, yet systematic adjustments of water tariffs have not been undertaken. Thus, although the NWSC's revenues cover operating cost, they do not cover capital costs (table 8). Capital costs have been financed by the government through aid from donors.

Hidden costs as a percentage of the NWSC's revenues have registered an impressive decline during the decade ending 2009. In 2009 hidden costs were around 65 percent of the NWSC's revenues compared to 243 percent in 1999. In 1999, underpricing of water, large distributional losses, and revenue collection issues were responsible for the large hidden costs (figure 16b). Despite progress in the NWSC's performance, underpricing of water still needs to be tackled to reduce the inefficiencies of the NWSC. In monetary terms, hidden costs have remained more or less stagnant at around $30 million a year. The NWSC records amongst the lowest hidden costs when compared to other East African countries (figure 16b).

Table 9. Evolution of operational indicators associated with NWSC, Uganda, 1999–2009

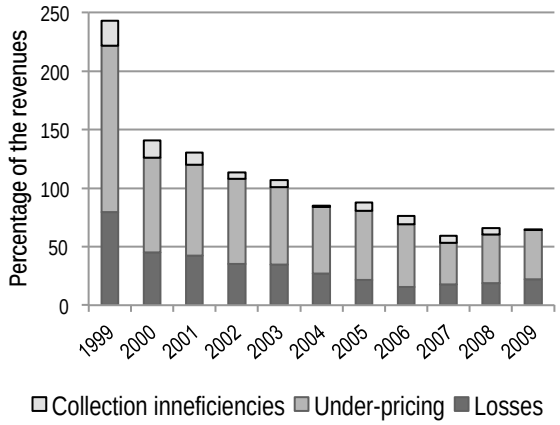
	Water delivered (million m^3/year)	System losses (%)	Collection ratio (%)	Average total cost (US$/$m^3$)	Average effective tariff (US$/$m^3$)	Total hidden costs (US$ million/year)	Total hidden costs (% revenues)
1999	46	48	76	1.18	0.45	30	243
2000	46	43	80	0.93	0.45	22	141
2001	47	43	85	0.93	0.45	22	131
2002	47	40	92	0.94	0.45	21	113
2003	51	39	92	0.88	0.47	20	107
2004	55	38	98	0.95	0.50	23	85
2005	58	34	89	0.99	0.53	26	88
2006	58	30	90	1.01	0.58	25	76

	Water delivered (million m^3/year)	System losses (%)	Collection ratio (%)	Average total cost (US$/$m^3$)	Average effective tariff (US$/$m^3$)	Total hidden costs (US$ million/year)	Total hidden costs (% revenues)
2007	61	33	92	1.18	0.81	25	59
2008	64	34	92	1.44	0.91	36	66
2009	69	36	99	1.22	0.76	32	65

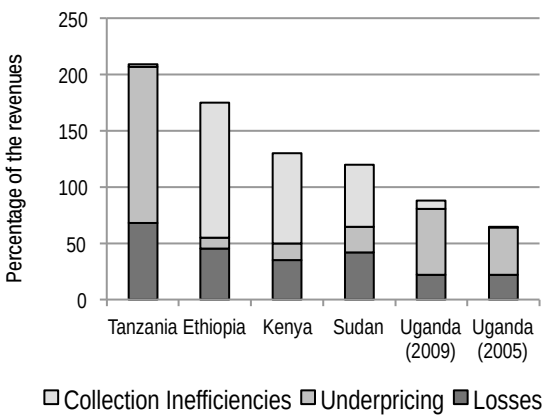
Source: Derived from Briceño-Garmendia, Smits, and Foster (2009).

Figure 16. Impressive reduction of hidden costs in Uganda, 1999–2009

a. Evolution of hidden costs in the NWSC



b. Hidden costs of selected water utilities



Source: Derived from Briceño-Garmendia, Smits, and Foster (2009).

The NWSC's progress over the last 15 years can largely be attributed to the introduction of a system of internal performance contracts implemented in 2004. In 1998 the government reformed the utility's management structure, and granted a concession to a private operator for the water distribution, billing, and collection in Kampala. The NWSC continued serving secondary cities and towns, where it established area performance contracts to remunerate local managers based on results. This model was successful at reducing nonrevenue water and increasing collection ratios in the areas under the NWSC management, but significant change was not achieved in Kampala. Following the end of the concession, the system of internal performance contracts was extended to Kampala operations in 2004, yielding better operational results. Since 2004 the combined effect of better performance indicators and increasing revenues (table 9) contributed significantly to the reduction in the hidden costs (figure 17a).

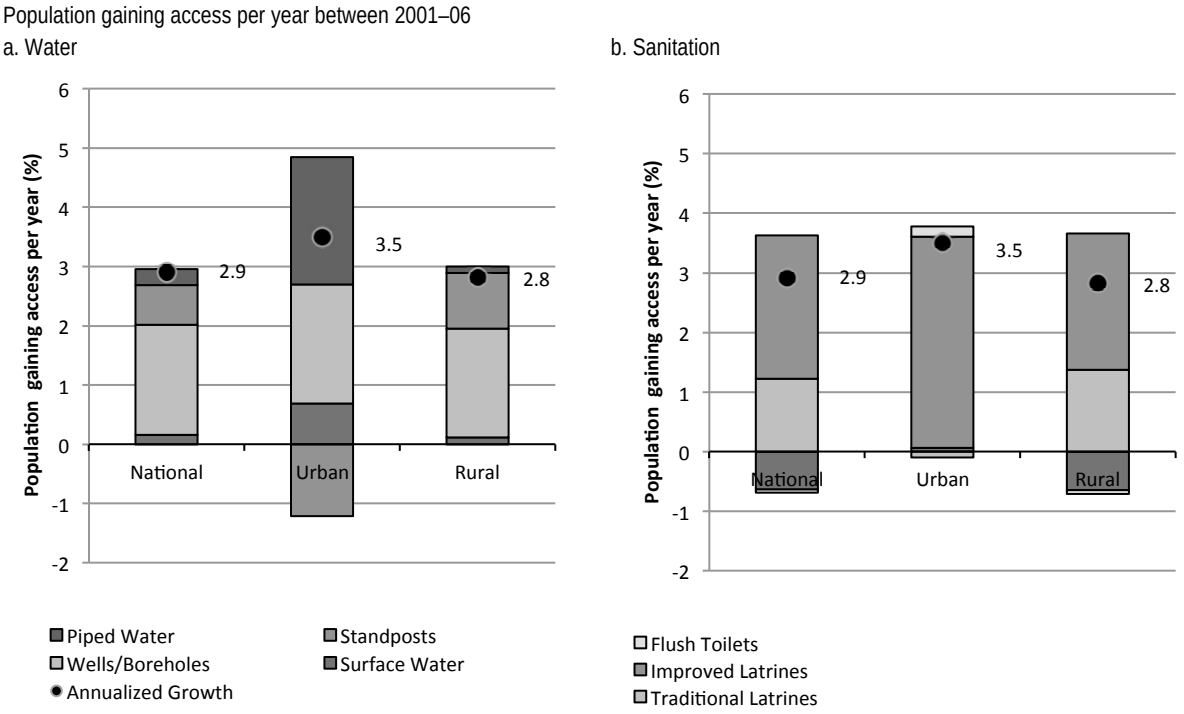
A similar approach based on performance contracts has been successfully adopted for small towns not served by the NWSC. The implementation of these performance agreements between the line ministry and town water supply authorities, which encourage the engagement of private operators in the operation and management of the water supply, has allowed Uganda to attract private participation into the sector while improving the quality of services and customer satisfaction. In 2008 the government started signing output based aid contracts with these private operators to design, build, and operate water systems. Under this scheme 961 connections have been completed (out of 2000 planned), 450 yard taps verified

benefiting 8,100 people, and in some towns the service is to be provided with no subsidy. As of 2010, 20 private operators were running 72 water systems in small towns.

Challenges

Uganda registered virtually no progress in access to safe forms of water supply between 2001 and 2006, compounded by challenges of growing population rates. Due in part to relatively low rates of urbanization, access to piped water has remained stagnant since 1995, and stands at barely one-third of the average for African low-income peers. Only 0.3 percent and 0.7 percent of the national population was gaining access per year to piped water and stand posts, respectively, between 2001 and 2006 (figure 17a)**.** Expansion in water supply has not been able to keep pace with growth in population, which grew at 2.9 percent nationally and 3.5 percent in urban areas. The slow progress in access to piped water and stand posts, as well as the predominantly rural population, is also responsible for the relatively low level of per capita water consumption. The domestic water consumption per capita per day in Uganda did not change between 1996 and 2009, and at 41 liters is equivalent to the rate in African low-income countries and a third of the rate in African middle-income countries.

Figure 17. Expansion in access to water and sanitation has not keep pace with population growth and increases reliance on untreated surface water and open defecation, 2001–06



Source: WHO (2010) from the Demographic and Health Surveys 2001 and 2006.

Power

Achievements

In the late 1990s, the Government of Uganda undertook a comprehensive power reform program that placed the power sector under private management operating on commercial principles. The sector has

subsequently been unbundled, legal and regulatory reforms have been introduced, and the operation of the main generation and distribution assets has been turned over to the private sector under long-term concession agreements.

There has been a doubling of generation infrastructure over the last few years. Following a serious drought and resulting power supply crisis in the mid-2000s, Uganda has made serious efforts both to expand its power generation assets and diversify its mix to become less reliant on hydropower. Generation capacity increased from 280 megawatts (MW) to 568 MW between 2005 and 2009. Despite this increase, generation capacity in 2009—at 18 MW per million of population—remained somewhat lower than the average for the African low-income peer group. But the Bujagali hydropower project will begin to come on stream during 2011 but will not be fully operational until 2012 (EIU 2011). With the additional 250 MW that will be available, capacity is expected to increase to 25 MW per million people, higher than in low-income peers. Although Uganda's generation portfolio has moved from a predominantly hydro-based system in 2005 to a more balanced hydro-thermal system in 2009 (EIA 2009), Bujagali will skew the generation portfolio once again toward hydropower.

Challenges

Access to power in Uganda is very limited. As of 2009, only 9 percent of the population had access to power, less than a third of the rate in other low-income African countries and a fraction of the rate in resource-rich countries. Uganda's access rates are more or less equal to access rates in Malawi, amongst the lowest in Africa. Access to electricity in urban areas is also limited. Even in urban areas, only 50 percent of the population has access to power compared to 86 percent in other low-income countries. In rural areas, only 5 percent of the population has access to power compared to 12 percent in low-income countries, falling short of Uganda's national rural access target of 10 percent (table 10).

Table 10. Benchmarking Uganda's power infrastructure, 2006

		Uganda	Low-income, nonfragile countries	Middle-income countries	Resource-rich countries
Access—national 2009	% population	9	33	50	46
Access—urban 2009	% population	50	86	100	100
Access—rural 2009	% population	6	12	33	28
Access—capital city 2009	% population	60	81	81	89
Installed generation capacity	MW	568	651	36,971	4,105
Installed generation capacity	MW per million people	18	20	799	43
Emergency generation capacity	MW	100	46	0	0
Self-generation capacity	MW	37	17	30	13
Firms that find power a constraint for business	% of firms	45	52	31	56
Firms with own generator	% of firms	29	41	18	63
Outages, number, annually	number per year	132	124	71	174
Outages, value lost	% of sales	10	6.5	1.6	7
Collection rate, reported by utility, electricity	% of billing	94	92	91	70

Cost-recovery ratio, historical	%	67	89	85	97
Revenue per unit	US cents per kWh	15	14	13	13
System losses	% generation	39	24	20	52
Total hidden costs	% revenue	103	69	0	168

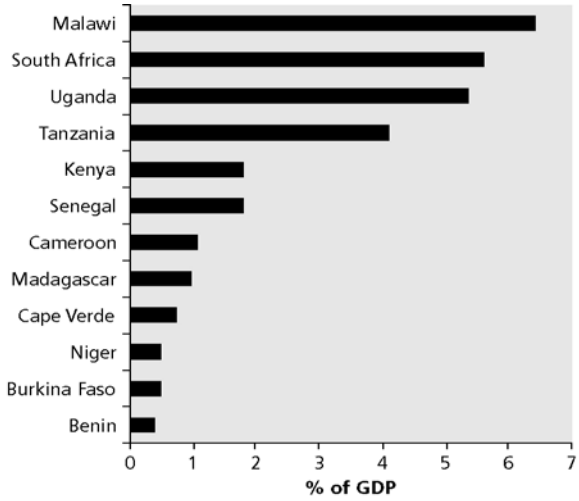
Source: Access to power (national) is based on information in 2009 and taken from World Energy Outlook, 2010; Access to power in rural areas taken from EIU (2011).

Note: All data for 2006 unless indicated otherwise.

Uganda's economy has suffered terribly from unreliable power supply during drought periods, notably in the mid-2000s. Episodes of weak hydrology and associated power cuts have tended to hobble business activity and competitiveness and consequently hinder growth. An enterprise survey undertaken at the height of the drought in the mid-2000s found that around 45 percent of firms cited power as a major constraint to doing business reporting over 130 outages per year and 55 days spent without power (World Bank 2006).

As a result, firms relied on generators to self-supply as much as 30 percent of their power needs, and nonetheless lost 10 percent of their sales due to inadequate power supply. As of 2006, firms had put in place 37 MW of self-generation capacity. Due to the high price of diesel (see below), the cost of self-generation of power, at $0.46–$1.44 per kilowatt-hour (kWh), is two to six times more expensive than grid-based electricity. As a result, private investment in physical capital may be constrained by the high costs of poor infrastructure (World Bank 2006). Over time, the lack of reliable power is a drag on economic growth. In 2007, 5 percent of Uganda's GDP was shaved off due to erratic power supply, amongst the highest in the continent (figure 18). Although the situation has improved since the height of the 2005 drought, reliability issues remain a concern and the system is still vulnerable to drought periods.

Figure 18. Power outages are a drag on GDP



Source: Eberhard and others 2008, using World Bank 2007 data.
Note: Economic cost is estimated as the value of lost load multiplied by the volume of load shedding. Value of lost load is derived from country-specific estimates based on enterprise survey data for sales lost due to power outages.

Ugandan power customers, including firms, see their competitiveness affected due to extremely expensive power generation costs. Historic total production power costs in Uganda are $0.24 per kWh (figure 19). These costs are amongst the highest in Africa; they would be typical for smaller thermal power systems rather than hydropower. Though Uganda has access to hydropower, that resource is subject to periodic droughts and calls for thermal backup, which is very costly due to the very high and escalating price of diesel (table 11).

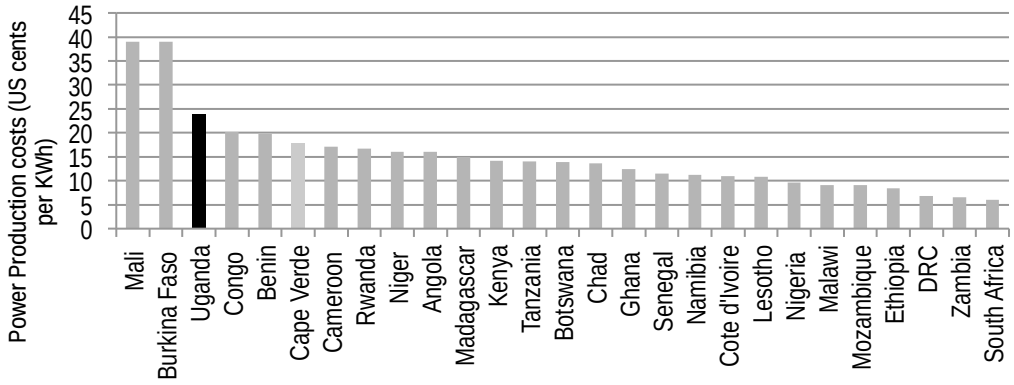
This became a particular problem during the drought of the mid-2000s when 100 megawatts of emergency diesel-based generation capacity was contracted to offset power shortages, leading to a huge escalation in sector costs. The situation was later exacerbated by delays in the commissioning of Bujagali hydro-power project, and the volume of short-term leased capacity has risen to 170 mega-watts further inflating costs. Diesel prices in East Africa have been traditionally higher than many other countries in southern and West Africa; in the case of Uganda, the prices are higher still, reflecting both the high costs of importing oil and the not insignificant transportation costs ($0.08 per tonne-km) for transporting oil along East African corridors.

Table 11. Diesel prices in Uganda are among the highest in Africa

	Cost of power production ($ per kWh)	Diesel prices ($ per liter)		
		2004	2006	2008
Ethiopia	8.4	42	62	89
Ghana	12	43	84	90
Kenya	14	76	98	114
Nigeria	15	45	66	113
Rwanda	17	99	108	137
Tanzania	14	87	99	130
Uganda	24	88	101	122

Source: GTZ 2009.

Figure 19. Extremely high costs of power production in Uganda



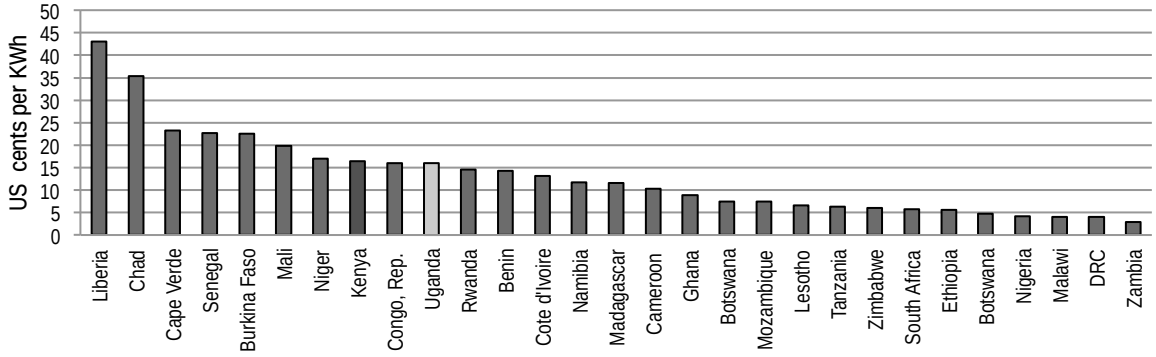
Source: Derived from Shkaratan and Briceño-Garmendia (2008); based on data from World Bank (2010a).
Note: DRC = Democratic Republic of Congo.

The average tariff at $0.16 fails to recover the high costs of power production. Uganda's power tariffs had remained fairly steady at around or just below $0.10 per kWh in the early 2000s. Tariffs were increased in 2006 to generate more revenue for the cash starved power sector following the drought and increased reliance on emergency power generation, reaching $0.18 per kWh in the late 2000s (figure 20). Despite these increases, domestic tariffs only covered about two-thirds of the costs of power production in 2010 (World Bank 2010a).

The financial performance of the sector is further undermined by Uganda's exceptionally high system losses. System losses in Uganda stood at 35-40 percent in the late 2000s. This is way above the low-income benchmark of 24 percent and about four times the best-practice benchmark of around 10 percent (table 10). High system losses have resisted even the introduction of private management within the

sector. Decrepit metering systems and outmoded billing software are partly responsible for the problem, which has been exacerbated by burgeoning illegal connections following the tariff increases since 2006.

Figure 20. Relatively high tariffs for power in Uganda, 2006



Source: Derived from Shkaratan and Briceño-Garmendia (2008) and World Bank (2010a).
Note: DRC = Democratic Republic of Congo.

The one area where financial performance has clearly improved has been in revenue collection. In 2005 collection of power bills was around 84 percent. This increased significantly to 94 percent in 2009, slightly higher than the average for low-income countries in Africa (table 10).

The financial burden of hidden costs has increased over time, shaving off as much as $230 million in revenues in 2009 or around 1.5 percent of Uganda's GDP. The absolute value of hidden costs continued to grow even in the aftermath of the drought, largely due to the surging demand that increased from around 1,000 gigawatt-hours (GWh) per year in 2006 to 1,500 in 2009. As of 2009, system losses drained $116 million from power sector revenues, while mispricing of power, though worse in prior years largely due to exchange rate fluctuations, resulted in losses of $103 million in 2009 (table 12). In an attempt to bolster sector finances, the government has provided direct budgetary subsidies to the sector, partly funded by donor contributions. These direct subsidies have continued to grow from $107 million in 2006 to $351 million in 2010 (World Bank, forthcoming).

In share of revenue terms, the burden of the hidden costs has decreased over time but is still high. Hidden costs in 2000 stood at around 300 percent of sector revenues, reached a low point of around 50 percent of sector revenues in 2003 before the drought, escalated back to 130 percent of revenues at the height of the drought in 2006, and have since declined only slightly to around 100 percent. In 2009 the burden associated with underpricing and system losses was almost equally split at 51 and 46 percent of revenues respectively (figure 21a). Uganda's hidden costs, though not the highest when compared to other East African countries, are still a major burden on the utility (figure 21b).

In the longer term, Uganda has the potential to become an exporter into the East African Power Pool. While Uganda's historic power production costs have been very high due to growing reliance on thermal power, these costs could be expected to fall in the long-term should Uganda complete the development of its hydro-power potential. Looking ahead, simulations suggest that Uganda's long run marginal costs could drop toward $0.12 per kWh, about half the level of historic costs, as Uganda develops more of its hydropower resources (figure 22). While Uganda's hydropower potential is not on a par with major

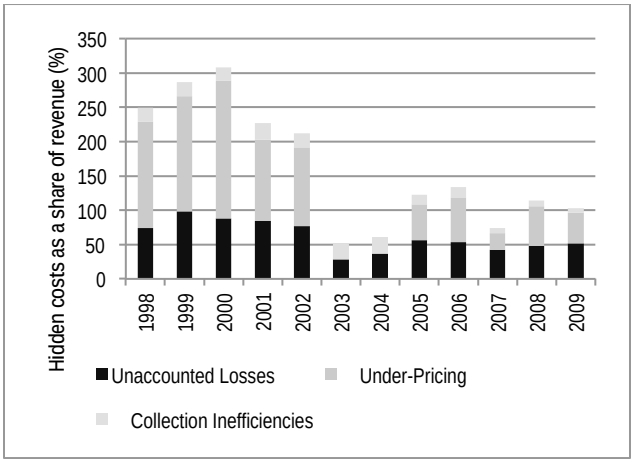
potential producers such as Ethiopia or the Democratic Republic of Congo, it is nonetheless significant and could be competitive in the East African regional context. If regional power trade were to develop unfettered in East Africa, Uganda could emerge as a significant hydropower exporter with the possibility to develop some 550 MW of export oriented hydropower, requiring some 500 megawatts of inter-connectors in support (Rosnes and Vennemo, 2009). A one-time investment of $145 million would be needed to develop this infrastructure, yielding an estimated return of 16 percent. Under such a scenario, Uganda would end up exporting about 50 percent of its domestic power consumption.

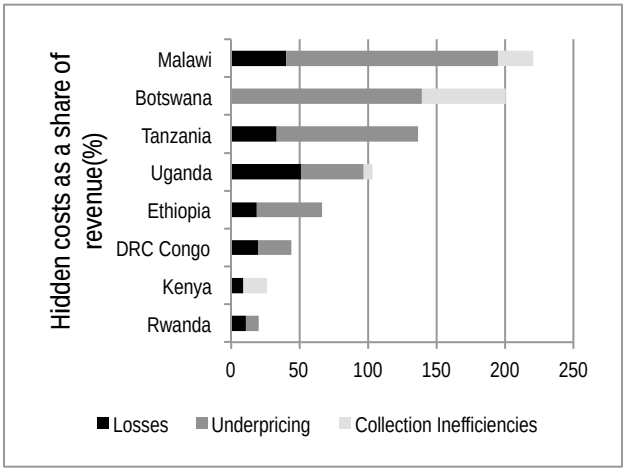
Table 12. Large hidden costs at associated with the power sector in Uganda, 1998–2009

	Power billings	System losses	Implicit collection ratio	Cost recovery benchmark	Average revenue	Average effective tariff	Total hidden costs	Total hidden costs
	(GWh/year)	(%)	(%)	(US$/kWh)	(US$/kWh)	(US$/kWh)	(US$ million/year)	(% revenues)
1998	865	36	81	0.09	0.08	0.08	153	249
1999	876	42	81	0.08	0.08	0.07	167	287
2000	1,094	36	81	0.07	0.07	0.06	207	308
2001	1,019	41	81	0.08	0.08	0.10	174	227
2002	1,139	41	81	0.08	0.08	0.09	199	212
2003	1,252	35	81	0.08	0.08	0.09	48	52
2004	1,226	41	81	0.08	0.07	0.10	56	61
2005	1,139	43	86	0.13	0.08	0.09	120	122
2006	1,043	38	85	0.20	0.12	0.12	162	134
2007	1,204	40	93	0.23	0.17	0.18	159	74
2008	1,345	39	90	0.26	0.18	0.16	277	115
2009	1,483	40	94	0.24	0.15	0.17	234	103

Source: Briceño-Garmendia, Smits, and Foster 2009; World Bank 2008 and 2010a. *Note:* kWh = kilowatt-hour; GWh = gigawatt-hour.

Figures 21. Hidden costs in revenue terms decreased between 1998 and 2005 but are on the higher side relative to several neighbors

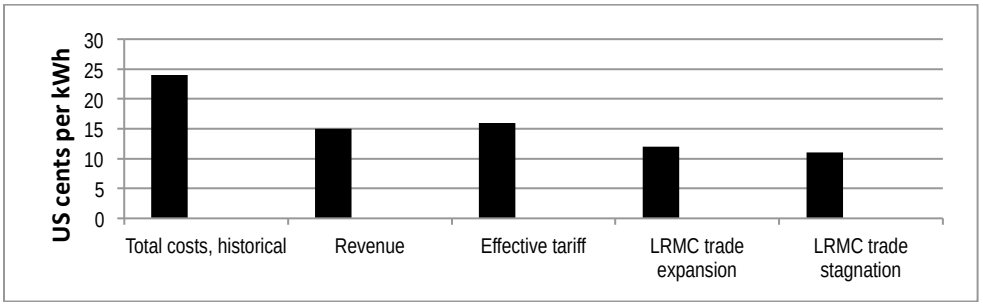




Source: Briceño-Garmendia, Smits, and Foster 2009; and World Bank 2008 and 2010a.

Note: DRC = Democratic Republic of Congo.

Figure 22. Long-run prospects look promising for Uganda



Source: Rosnes and Vennamo 2009; World Bank 2008 and 2010.
Note: LRMC = long-run margin costs.

Information and communication technologies

Achievements

Uganda has made notable progress in telecommunications, particularly through mobile networks, outperforming low-income countries in this area (table 13). Mobile penetration has risen from less than one percent in 2000 to 28 percent by 2009, consistent with what is observed in low-income African countries. This level of access is higher than the penetration rate due to shared usage in households and public mobile phone facilities. Furthermore, there are no infrastructural barriers to mobile access, with the Uganda Communications Commission (UCC) reporting that mobile cellular signals covered 100 percent of the population by December 2008b (UCC 2009). This is a major achievement compared to the low-income benchmark of only 56 percent. Meanwhile, in 2006 (the latest year available), the Uganda Bureau of Statistics (UBOS) reported that almost half of inhabitants already had access to telephone facilities (UBOS 2006), and the number of public pay telephones has increased more than 30 times since 2000 to almost 100,000 by 2009.

Table 13. Benchmarking ICT indicators

		Uganda			Low-income countries
Access		2000	2008	2009	
GSM coverage	% population under signal	16	100	100	56
International bandwidth	Bits/person	0.08	16	61	24
Internet	Users/100 people	0.2	7.8	8.4	4.6
Landline	Subscribers per 100 people	0.3	0.5	0.6	4.6
Mobile phone	Subscribers per 100 people	0.6	26.7	28.3	28.5
Prices					
Price of monthly mobile basket	US$		9.7	8.3	10
Price of monthly fixed-line basket	US$		13.3	11.3	9.8
Price of monthly fixed broadband	US$		300	300	102
Price of a call to the United States per minute	US$		0.26	0.22	
Price of an inter-Africa call per minute	US$		0.63	0.31	

Source: Adapted from UCC, UTL, MTN, and World Bank ICT At-a-Glance.

An early telecommunication sector reformer, Uganda introduced a private cellular operator in 1994, created the industry regulator UCC in 1997, licensed a second national operator in 1998, and privatized the incumbent Uganda Telecommunications Limited (UTL) in 2000 (ITU 2001). It has progressively introduced competition in the mobile sector with five operators providing service by 2009. It has also created a technology neutral streamlined licensing process.

Inflow of foreign investment in Uganda, particularly from companies that are involved in more than one country, has contributed to connectivity and service enhancement. Collaboration over mobile roaming and fiber optic connectivity between Rwandatel and Uganda Telecom has been facilitated by common ownership. These multi-country networks have provided beneficial regional roaming arrangements (box 2)

Box 2. Cooperative private sector development of fiber-optic infrastructure in Uganda

As of 2009, Uganda's telecommunications market had five mobile operators and several ISPs. MTN and UTL are the two national fixed line operators and are also significant mobile operators. Both companies also have operations in Rwanda and thus have a common interest in establishing a communications link across the border from Uganda to Rwanda. In 2007 MTN constructed a fiber-optic cable from Kigali, Rwanda, to the border with Uganda. The company also recently announced a deal with its competitor UTL to jointly develop the fiber-optic network on the Uganda side—a good example of competing operators forming a cooperative arrangement to lower the costs of developing fiber-optic networks outside major urban areas. But such an arrangement raises concerns for the market in Rwanda since the only fiber optic connection to the country will be jointly controlled by the only two network operators in Rwanda. Such concerns may ease as more licenses are issued in Rwanda and competition grows.

Source: World Bank 2009a.

Uganda has gained access to the EASSy submarine cable via Kenya. Up to 2009 there were in any case no international submarine connections in East Africa. Since then, three systems connecting East Africa have been launched. Uganda has gained access to these systems via domestic fiber-optic backbones to the Kenyan border for onward connectivity to submarine cable landing stations in Mombasa. This access to abundant bandwidth quadrupled Uganda's international Internet capacity between 2008 and 2009 and increased the number of bits per second per person from 16 to 61 (figure 23a).

Challenges

The overall performance of the ICT sector is impeded by factors external to the industry. Factors such as high service taxes, low levels of electrification, and a landlocked geography raise the level of ICT prices making service unaffordable for many. Although the prices of fixed and mobile telephone services are close to those in the peer group, the prices of broadband services in Uganda are more than three times as high as in the average low-income country in Africa.

Uganda has Africa's highest rate of taxes applied to telecommunications services (GSMA 2009). In addition to the value added tax (VAT), mobile phone users also have to pay an additional excise tax. While these taxes have benefited the government budget—the communications sector was the largest contributor to government revenue in the 2009 fiscal year (UCC 2010)—they raise service prices affecting mobile take-up and use. Studies indicate that reducing the excise tax would lead to a higher

mobile subscription level that would in turn generate more VAT revenue for the government and offset the loss from excise taxes (UCC 2007).

Very low levels of electrification—reported as 9 percent of households in 2009—impacts ICT take-up since users find it difficult to recharge mobile handsets or power ICT equipment such as computers. It also inhibits network roll-out and results in higher costs since providers must resort to higher priced alternatives such as diesel fuel to power base stations.

Table 14. ICT pricing trends for EAC countries, 2005–10

In US dollars	2005	2006	2009	2010
Monthly prepaid mobile basket				
Kenya	14.60	15.93	7.36	7.36
Rwanda	11.64	11.31	6.16	5.39
Tanzania	13.46	10.40	9.32	9.28
Uganda	8.08	9.60	8.32	8.32
Monthly postpaid fixed basket				
Kenya	10.42	14.23	—	—
Rwanda	4.84	7.69	—	—
Tanzania	12.43	10.82	—	9.65
Uganda	12.96	12.49	—	10.25
ADSL monthly service charge				
Kenya	—	220.44	37.51	37.51
Rwanda	—	—	86.38	86.38
Tanzania	—	38.87	29.74	29.74
Uganda	—	300.00	300.00	300.00

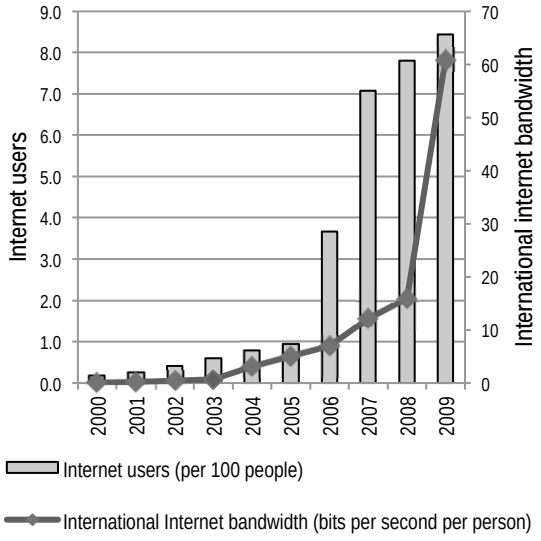
Source: AICD.
Note: EAC = East African Community.
— = Not available.

Prices of internet services remained high in Uganda as of 2010. Reduction in prices would boost Uganda's already relatively high Internet penetration and foster the development of ICT services and IT-enabled exports, helping the country reduce the gap with higher performing peer countries (figure 23a). Fixed broadband pricing has shown little traction and digital subscriber line (DSL) tariffs remain high given the limited number of wired telephone lines. High-speed wireless networks on the other hand offer more attractive tariffs and will drive Uganda's Internet progress.[3] Prices are expected to fall following Uganda's connection to the EASSy undersea cable

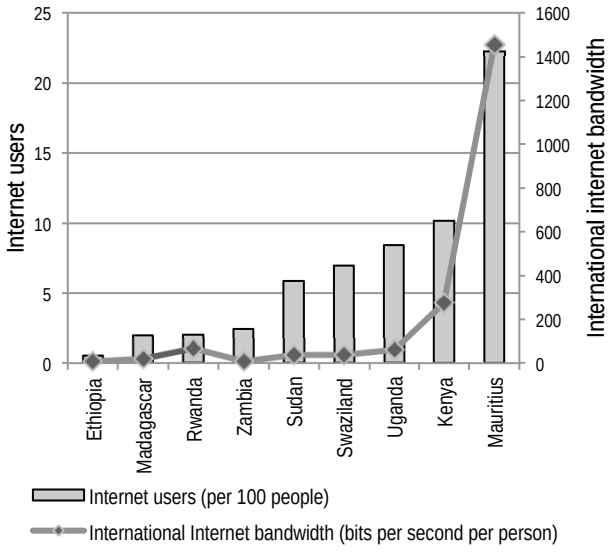
[3] For example the UCC reported that in June 2009, mobile accounted for 92 percent of all Internet subscriptions. See UCC (2009).

Figure 23. Uganda's Internet market, 2008–09

a. Internet service trends, users, 2000–09



b. Internet service trends, COMESA, 2008–09



Source: AICD.
Note: COMESA = Common Market for Eastern and Southern Africa.

Financing Uganda's infrastructure

To meet its most pressing infrastructure needs and catch up with developing countries in other parts of the world, Uganda needs to expand its infrastructure assets in key areas (table 15). The targets outlined below are purely illustrative, but they represent a level of aspiration that is not unreasonable. Developed in a standardized way across African countries, they allow for cross-country comparisons of the affordability of meeting the targets, which can be modified or delayed as needed to achieve financial balance.

Table 15. Illustrative investment targets for infrastructure in Uganda

	Economic target	Social target
ICT	Install fiber-optic links to neighboring capitals and submarine cables.	Provide universal access to GSM signal and public broadband facilities.
Irrigation	Develop additional 445,041 hectares of economically viable small scale irrigation.	n.a.
Power	Develop 1,258 MW of new generation capacity and 537 MW inter-connectors (no-trade scenario).	Increase electrification to 27.2 percent (100 percent urban and 15.1 percent rural).
Transport	Achieve regional (national) connectivity with good quality 2-lane (1-lane) paved road.	Provide rural road access to 27 percent of the highest-value agricultural land, and urban road access within 500 meters.
WSS	n.a.	Achieve Millennium Development Goals, clear sector rehabilitation backlog.

Source: Mayer and others 2009; Rosnes and Vennemo 2009; Carruthers, Krishnamani, and Murray 2009; You and others 2009.
Note: WSS = water supply and sanitation; ICT = information and communication technology; GSM = global system for mobile communications. n.a. = Not applicable.

Meeting these illustrative infrastructure targets for Uganda would cost $1.4 billion per year over a decade. Capital expenditure would account for 85 percent of this requirement. The power sector has the highest spending needs and will require an estimated $0.4 billion per year; the water and sanitation sector has the second-highest spending needs at about $0.3 billion per year to meet the MDGs. Around $0.2 billion per annum will be required to meet needs in each of the ICT, irrigation, and transport sectors (table 16).

Table 16. Indicative infrastructure spending needs in Uganda, 2006–15

US$ million per year

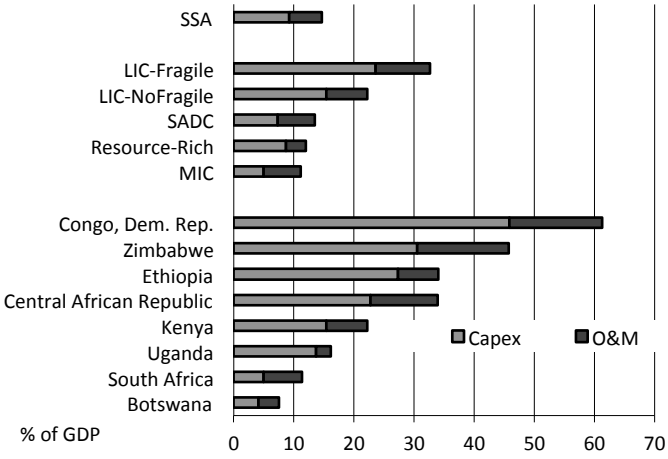
Sector	Capital expenditure	Operations and maintenance	Total needs
ICT	143	18	161
Irrigation	231	1	232
Power (nontrade)	390	57	447
Transport	137	84	221
WSS	293	56	348
Total	1,194	216	1,410

Source: Mayer and others 2009Rosnes and Vennemo 2009; Carruthers, Krishnamani, and Murray 2009; You and others 2009.
Derived from models that are available online at www.infrastructureafrica.org/aicd/tools/models.
Note: WSS = water supply and sanitation; ICT = information and communication technology.

Infrastructure spending needs amount to around 16 percent of GDP. This is somewhat lower than for other countries in East and southern Africa (figure 24). Investment would absorb around 14 percent of GDP, about the same level of effort China made on infrastructure during the mid-2000s.

Figure 24. Uganda Republic's infrastructure spending needs in the regional context, share of GDP, 2006–15

Estimated infrastructure spending needed to meet targets, as percentage of GDP



Source: Mayer and others 2009; Rosnes and Vennemo 2009; Carruthers, Krishnamani, and Murray 2009; You and others, AICD 2009.
Derived from models that are available online at www.infrastructureafrica.org/aicd/tools/models.
Note: WSS = water supply and sanitation; ICT = information and communication technology.

Uganda already spends a sizable $1 billion per year to meet its infrastructure needs with a mix of public and private funds (table 17). About 65 percent of the total spending is allocated to capital expenditure and 35 percent to operating expenditures. About half of existing spending is channeled to the power sector. Operating expenditure is entirely covered from budgetary resources and payments by infrastructure users. Unusually, Uganda relies heavily on the private sector to fund as much as 40 percent of total capital spending on infrastructure. As in most countries, ICT attracts the largest share of private investment in infrastructure. But in contrast to many other countries, the private sector also invests significantly in Uganda's power, transport and even water infrastructure. The second most important source of funding for infrastructure investment in Uganda is overseas development assistance (ODA), which supplies 33 percent of total funding and is directed mostly to power, transport and water. As is rarely the case in Africa, ODA and private participation in infrastructure (PPI) flows to the water and sanitation sectors in Uganda are broadly comparable. Third, about 26 percent of capital expenditure is funded by federal and district governments and state-owned enterprises (SOEs). Non–Organisation of Economic Co-operation and Development (non-OECD) financiers account for only around 5 percent of capital spending; their presence is most pronounced in the water and transport sectors.

Table 17. Financial flows to Uganda's infrastructure, 2001–09

US$ millions per year

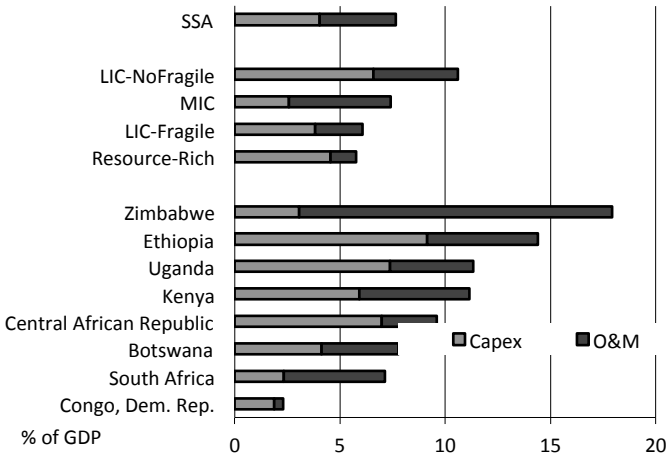
	O&M	Capital expenditure					
	Public sector	Public sector	ODA	Non-OECD financiers	PPI	Total CAPEX	Total spending
ICT	0.3	0.3	2	0	128	130	130
Irrigation	0.1	0.1	0	0	0	0	0.2
Power	226	71	88	0	65	224	451
Transport	81	81	75	2	22	180	261
WSS	37	18	47	3	41	109	147
Total	345	170	213	5	256	644	989

Source: Derived from Foster and Briceño-Garmendia (2009).

Note: O&M = operations and maintenance; ODA = official development assistance; PPI = private participation in infrastructure; CAPEX = capital expenditure; OECD = Organisation for Economic Co-operation and Development; WSS = water supply and sanitation; ICT = information and communication technology.

Existing infrastructure spending in Uganda amounts to around 11.3 percent of GDP (figure 25). Uganda devotes a relatively high share of its GDP to infrastructure compared to many other low-income countries in Africa. Relative to its peers, Uganda invests twice as much in power infrastructure and comparable or slightly smaller amounts on ICT, transport, and water infrastructure (figure 26). All infrastructure sectors receive at least as much or more private finance than other peer low-income African countries.

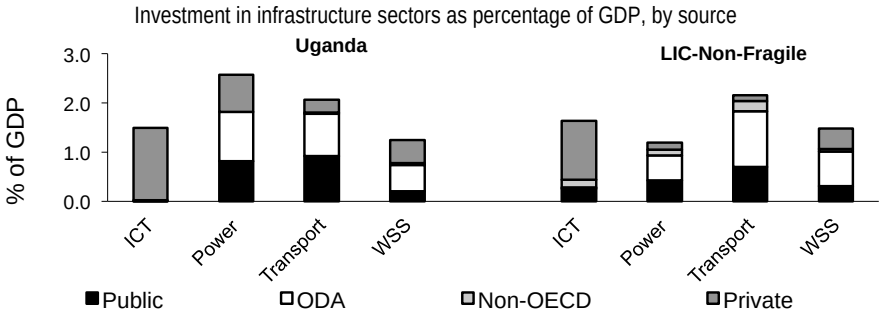
Figure 25. Uganda's existing infrastructure spending is quite high, 2001–09



Source: Derived from Foster and Briceño-Garmendia (2009).

Note: LIC = low-income country; MIC = middle-income country; SSA = Sub-Saharan Africa; GDP = gross domestic product; O&M = operations and maintenance; CAPEX = capital expenditure

Figure 26. Uganda's pattern of capital investment in infrastructure differs from that of comparator countries, 2001–09



Source: Derived from Briceño-Garmendia, Smits, and Foster (2009).

Note: Private investment includes self-financing by households.

ODA = official development assistance; OECD = Organisation for Economic Co-operation and Development; ICT = information and communication technology; GDP = gross domestic product; WSS = water supply and sanitation; LIC = low-income country.

How much more can be done within the existing resource envelope?

Inefficiencies in Uganda divert as much as $307 million in resources (table 18). By far the largest source of inefficiencies is the power sector, where underpricing and distribution losses *each* hemorrhage more than $100 million a year. The same types of inefficiencies are also pronounced in the water sector, but the volume of resources involved is much smaller at under $40 million in total. Another significant issue is underexecution of capital budgets in the transport sector, leading to losses of $24 million a year.

Table 18. Uganda's potential gains from greater operational efficiency, 2000–09

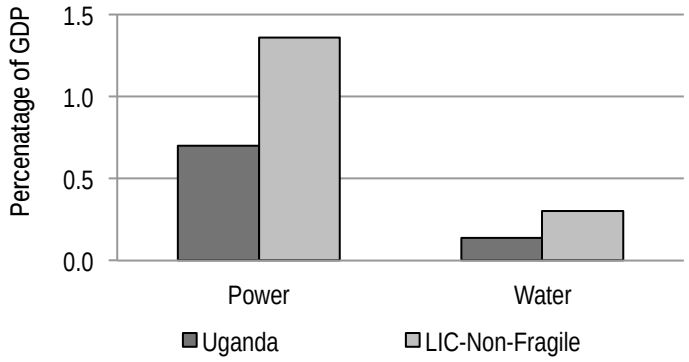
US$ millions	ICT	Irrigation	Power	Transport	WSS	Total
Under-recovery of costs	—	n.a.	103	n.a.	21	124
Overstaffing	n.a.	—	8	—	5	13
Distribution losses	—	—	116	—	11	127
Undercollection	—	n.a.	15	n.a.	0	15
Low budget execution	0	0	1	24	2	27
Total	0	0	243	24	39	307

Source: Derived from Foster and Briceño-Garmendia (2009).
Note: WSS = water supply and sanitation; ICT = information and communication technology.
— = Not available.
n.a. = Not applicable.

Underpricing of utility services is a significant problem for Uganda, although this problem is even more serious among Uganda's peers. Mispricing of power costs Uganda about $103 million each year, or around 0.7 percent of the country's GDP. It is estimated that the average total cost of producing electricity has been $0.24 per kWh historically in Uganda, while the average effective tariff stood at $0.15 as of 2009. While the underpricing of power remains a macroeconomically significant issue in Uganda, the problem is even more pronounced in Uganda's peer group of other low-income countries in Africa (figure 27). In the water sector, average tariffs charged by NWSC stand at $0.76 per m^3 versus an estimated benchmark tariff of $1.20 per m^3 for full recovery of both operating and capital costs. The consequent macroeconomic burden of undercharging for water services—at 0.1 percent of GDP—is significantly lower than that for power, and again comparatively lower than for the peer group.

Figure 17. Underpricing of power and water in Uganda is comparatively less burdensome, 2001–09

Financial burden of underpricing, as percentage of GDP



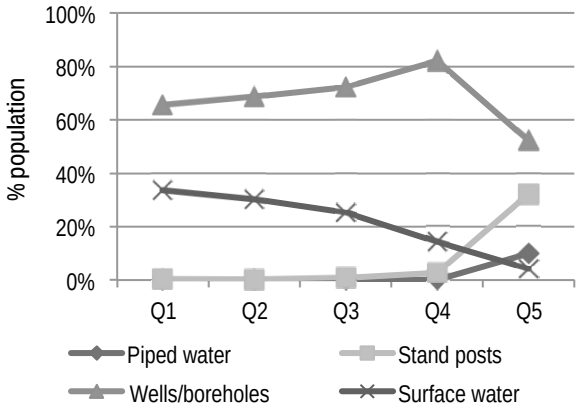
Source: Derived from Briceño-Garmendia, Smits, and Foster (2009).
Note: GDP = gross domestic product; LIC = low-income country.

Because of inequitable access to power and water services in Uganda, subsidized tariffs are highly regressive. Close to 100 percent of those that have electricity or piped water connections belong to the top 20 percent of the expenditure distribution; such connections are nonexistent for poorer households (figure 28). Only the richest quintile has access to piped water. Most of the poorest quintile still rely on untreated

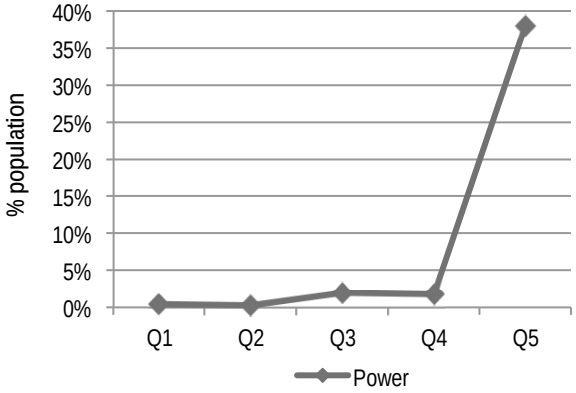
surface water. This distribution of connections virtually guarantees that any price subsidy to piped water services will be extremely regressive.

Figure 28. Consumption of infrastructure services in Uganda is highly differentiated by budget, 2001–09

a. Mode of water supply, by income quintile



b. Prevalence of connection to power grid among population, by income quintile

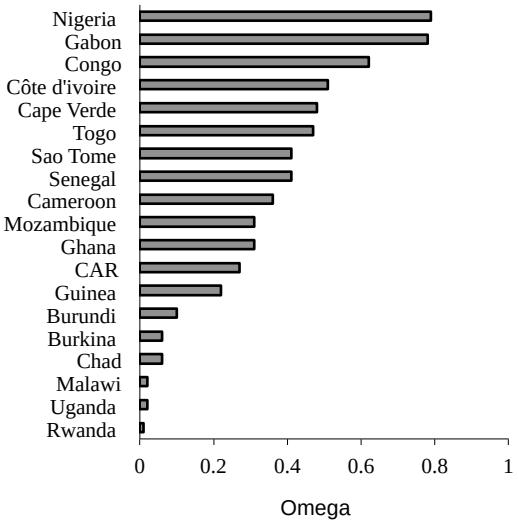


Source: Banerjee and others 2009.

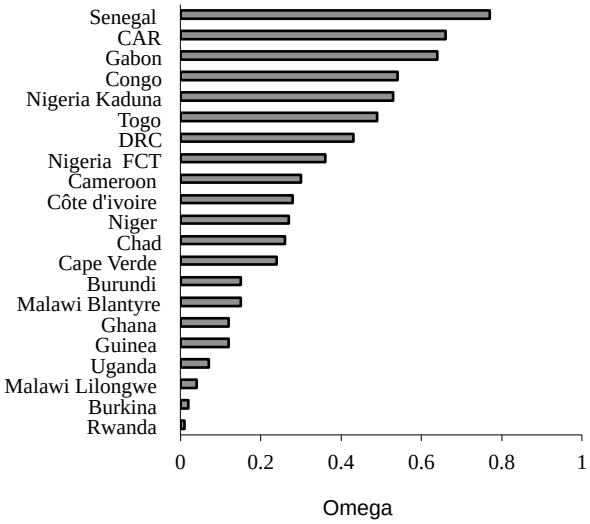
Note: Q1—first budget quintile, Q2—second budget quintile, and so on.

Figure 29. Electricity and water subsidies that reach the poor, 2006

a. Electricity



b. Water



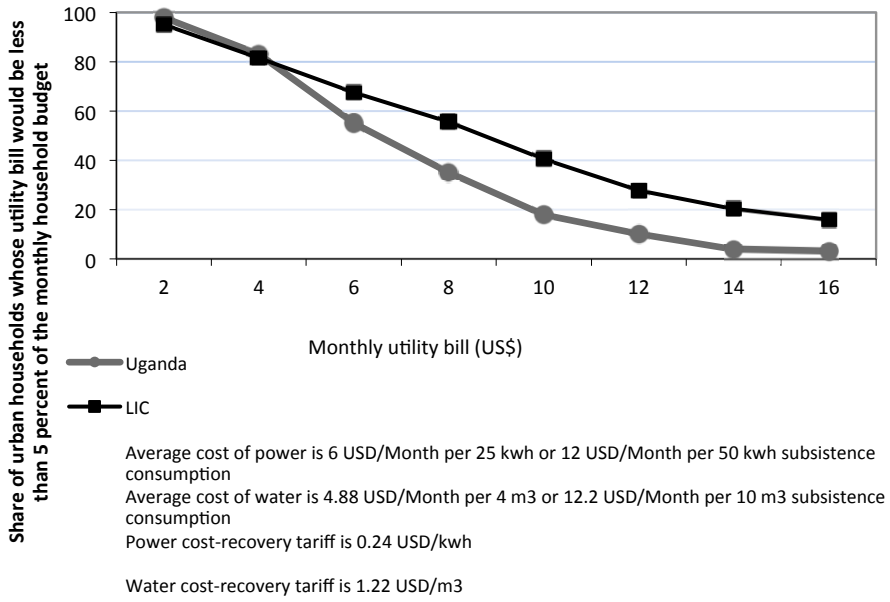
Source: Banerjee and others, 2009.

Note: Omega is a measure of distributional incidence, or the share of subsidies received by the poor as a percentage of their share in the population. The higher the value of omega, the better the distributional performance of the subsidy. Values of omega below 1 denote a regressive subsidy and values above 1 denote a progressive subsidy.

CAR = Central African Republic; DRC = Democractic Republic of Congo

Cost-recovery tariffs do not look to be affordable for the majority of the population in Uganda; but more so for the relatively affluent minority with access to services. With a cost-recovery tariff of $0.24 per kWh and a monthly subsistence consumption of 50 kWh, the associated utility bill would come to $12 per month. Based on the distribution of household budgets in Uganda, monthly utility bills at these levels would be affordable by only 10 percent of the population (figure 30). Similarly, a bill for subsistence consumption of 10 m^3 of water would come to $12 per month. A more limited level of subsistence consumption of 25 kWh per month for power and 4 m^3 per month for water—which is capable of meeting the most basic needs—would cost $6 and $5 per month respectively, but would still only be affordable to barely half of the population. Nevertheless, it is important to recall that access to power and piped water services in Uganda at present is very limited and largely confined to the top quintile of the budget distribution. As a result, among those that have access to the service today the majority should be able to afford a subsistence level of consumption of these services. Affordability will become a serious issue as Uganda accelerates coverage of utility services, however. (Given that this analysis is based on the 2002 Household Expenditure Survey, the affordability situation is likely to have improved significantly in the meantime given sustained economic growth.)

Figure 30. Affordability in Uganda worse than in other low-income countries, 2002



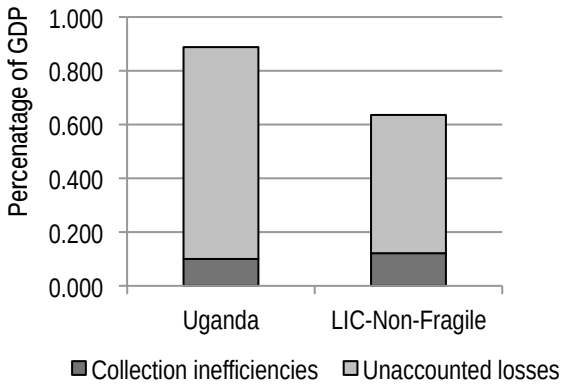
Source: Banerjee and others 2009.
Note: LIC = low-income country; kWh = kilowatt-hour.

Operational inefficiencies of power and water utilities cost Uganda a further $155 million a year, equivalent to 1.11 percent of GDP. The annual value of inefficiencies in the power sector, at $139 million, is substantially higher than for the water sector, at $16 million. The burden of utility inefficiencies in Uganda is somewhat higher than for the benchmark countries in the power sector, but lower in the water sector (figure 31). The Uganda Electricity Distribution Company Limited (UEDCL) suffers from high system losses and low collection efficiency. Uganda's 2009 distributional losses of 39.8 percent are four times the best practice 10 percent benchmark, resulting in $116 million in potential

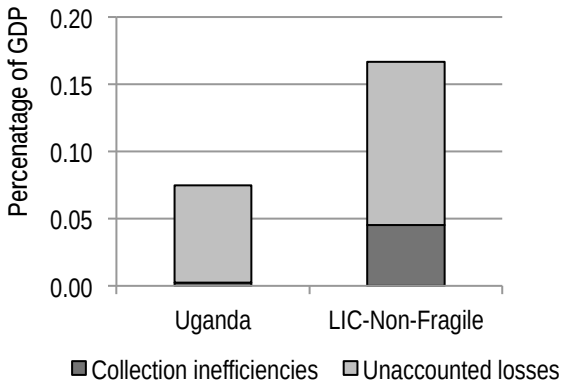
savings. Another $15 million per year could be saved by raising bill collection efficiency from 94 to 100 percent. Distributional losses are the driver of operational inefficiencies in the water sector. Uganda could avoid this cost by reducing nonrevenue water losses from 2009's 36 percent level, to the 20 percent benchmark of a well-functioning utility. Bill collection, on the other hand was close to 99 percent in 2009.

Figure 31. Uganda's power and water utilities burden of inefficiency, 2001–09

a. Uncollected bills and unaccounted losses in the power sector, as a percentage of GDP



b. Uncollected bills and unaccounted losses in the water sector, as a percentage of GDP



Source: Derived from Briceño-Garmendia, Smits, and Foster (2009).

Annual funding gap

Uganda's infrastructure funding gap amounts to $425 million per year, or about 5 percent of GDP, once efficiencies are captured. In contrast to many of its peers, Uganda does not seem to face a significant funding gap for power or transport. In the power sector, this is mainly as a result of the substantial efficiency gap, as well as the potential for reallocating expenditure within the sector from operating to capital expenditure. The largest funding gap is to be found in the water and sanitation sector (table 19). Overall, Uganda's infrastructure funding gap looks manageable relative to its GDP and compared to funding gaps found in other low-income countries in Africa.

Table 19. Funding gaps by sector

US$ millions	ICT	Irrigation	Power	Transport	WSS	Total
Spending needs	(161)	(231)	(447)	(221)	(348)	(1,409)
Existing spending*	130	0	281	218	147	776
Reallocation potential within sectors	0	0	166	3	0	169
Efficiency gains	0	0	243	24	39	307
Funding gap	(31)	(231)	-	-	(163)	(425)

Source: Derived from Foster and Briceño-Garmendia (2009).

Note: Potential overspending across sectors is not included in the calculation of the funding gap, because it cannot be assumed that it would be applied toward other infrastructure sectors.

— = Not available.

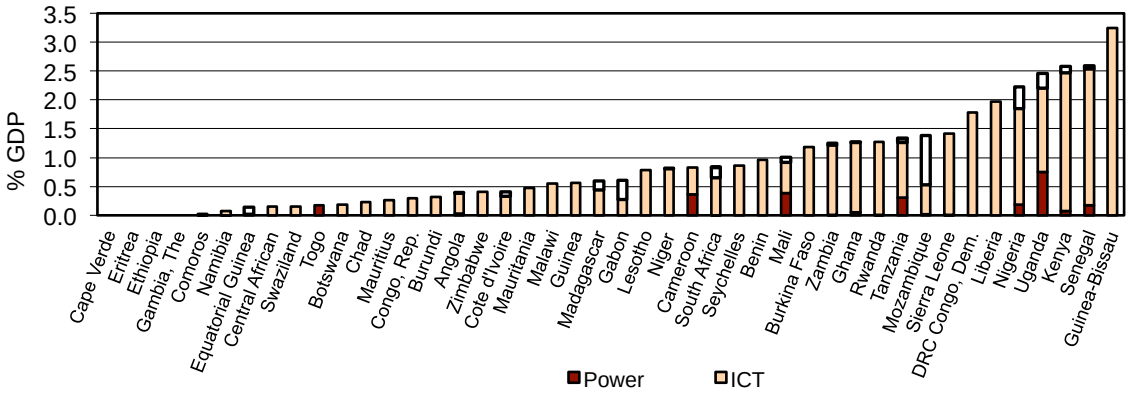
*traced to needs.

What else can be done?

Broadly speaking there are three alternative ways to close the infrastructure funding gap. The first is to raise additional finance. The second is to find most cost-effective ways of meeting the infrastructure targets. The third is to lengthen the time period needed to reach the targets, beyond the ten years assumed in this analysis.

Uganda's prospects for raising the volumes of additional infrastructure funding needed look quite hopeful for a number of reasons. Once efficiency gains are fully captured there would likely be surplus spending in the power sector that could potentially be reallocated toward sectors with funding gaps. Looking ahead, Uganda's new-found oil wealth will in due course boost fiscal revenues part of which could be allocated to close the infrastructure funding gap. This gives Uganda an important new source of funding, which – however – should not become a pretext for overlooking efficiency issues. Furthermore, Uganda has been one of the most successful African countries at attracting private finance to the infrastructure sectors, and not only into telecommunications. It is unclear whether this track record suggests that even more could be done, or whether it rather signals that all of the most relevant opportunities have already been tapped (figure 32).

Figure 32. Numerous African countries capture more private investment than Uganda



Source: Private Participation in Infrastructure Database, 2010 .
Note: GDP = gross domestic product; ICT = information and communications technology.

Continuing the existing strategy of relying on lower-cost technologies could somewhat reduce the funding gap for water and sanitation, but only to a modest extent. Meeting the MDGs for water supply and sanitation with lower-cost technologies than those that have been used to date (entailing greater reliance on stand posts, boreholes, and improved latrines) could reduce the associated price tag from $348 million to $329 million each year. But the savings, at just under $20 million are relatively small, reflecting the fact that Uganda has already gone a long way toward adopting lower-cost technologies, and the impact on the sectoral and global infrastructure funding gap would be modest.

Simply focusing on stemming inefficiencies could greatly accelerate the achievement of infrastructure targets. Even if it were not possible to close the funding gap any further, simply by capturing the identified inefficiencies Uganda could still meet the postulated infrastructure targets within a 20-year

period, even at current levels of spending. Without stemming inefficiencies, however, the existing resource envelope would not suffice to meet power infrastructure targets in the medium term.

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This country report draws upon a wide range of papers, databases, models, and maps that were created as part of the Africa Infrastructure Country Diagnostic. All of these can be downloaded from the project Web site: www.infrastructureafrica.org. For papers go to the document page (www.infrastructureafrica.org/aicd/documents), for databases to the data page (www.infrastructureafrica.org/aicd/tools/data), for models go to the models page (www.infrastructureafrica.org/aicd/tools/models), and for maps to the map page (www.infrastructureafrica.org/aicd/tools/maps). The references for the papers that were used to compile this country report are provided in the table below.

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