WPS5384

Policy Research Working Paper 5384

Cost Recovery, Equity, and Efficiency in Water Tariffs

Evidence from African Utilities

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The World Bank
Africa Region
Sustainable Development Division
July 2010

Abstract

Water and sanitation utilities in Africa operate in a high-cost environment. They also have a mandate to at least partially recover their costs of operations and maintenance (O&M). As a result, water tariffs are higher than in other regions of the world.

The increasing block tariff (IBT) is the most common tariff structure in Africa. Most African utilities are able to achieve O&M cost recovery at the highest block tariffs, but not at the first-block tariffs, which are designed to provide affordable water to low-volume consumers, who are often poor. At the same time, few utilities can recover even a small part of their capital costs, even in the highest tariff blocks.

Unfortunately, the equity objectives of the IBT structure are not met in many countries. The subsidy to the lowest tariff-block does not benefit the poor exclusively, and the minimum consumption charge is often burdensome for the poorest customers. Many poor households cannot even afford a connection to the piped water network. This can be a significant barrier to expansion for utilities. Therefore, many countries have begun to subsidize household connections.

For many households, standposts managed by utilities, donors, or private operators have emerged as an alternative to piped water. Those managed by utilities or that supply utility water are expected to use the formal utility tariffs, which are kept low to make water affordable for low-income households. The price for water that is resold through informal channels, however, is much more expensive than piped water.

This paper—a product of the Sustainable Development Division, Africa Region—is part of a larger effort in the department to improve the global knowledge base on African infrastructure as part of the Africa Infrastructure Country Diagnostic. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at sgbanerjee@worldbank.org.

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Acronyms and abbreviations

Addis Ababa Water and Sewerage Authority	AWSA
Africa Infrastructure Country Diagnostic	AICD
Blantyre Water Board	BWB
Central Region Water Board	CRWB
Chad Water and Electric Society	STEE
Company of Electricity and Water	ELECTRA
Dar es Salaam Water and Sewerage Corporation	DAWASCO
Democratic Republic of Congo	DRC
Dodoma Urban Water & Sewerage	DUWASA
Federal Capital Territory Water Board	FCTWB
Ghana Water Company Limited	GWCL
Global Water Intelligence	GWI
gross national income	GNI
increasing block tariff	IBT
International Benchmarking Initiative	IBNET
the Kisumu Water and Sewerage Company Limited	KIWASCO
Latin America and Caribbean	LAC
Lilongwe Water Board	LWB
long-run marginal cost	LRMC
low-income country	LIC
Lusaka Water and Sewerage Company	LWSC
middle-income country	MIC
Millennium Development Goals	MDG
Municipality Water Services Agencies	MWSA
National Water and Wastewater Office of Burkina Faso	ONEA
National Water Company of Benin	SONEB
National Water Corporation	NWC
National Water and Sewerage Corporation	NWSC
Network for Distribution of Water and Electricity	REGIDESO
operations and maintenance	O&M
Organisation for Economic Co-operation and Development	OECD
Poverty and social impact analysis	PSIA
Sénégalaise des Eaux	SDE
Senegal National Sanitation Agency	ONAS
Society for the Development of Employment in Industry and Services	SODESI
Kaduna Water Board	Kaduna WB
Water Electricity Malagasy Company	JIRAMA
Water Supply and Sanitation	WSS
World Health Organisation	WHO
Water Utility Partnership	WUP

1 The conflicting goals of tariff design

Water systems in developing countries must (1) provide services that are safe, desirable, and affordable to consumers; and (2) ensure an institutional and commercial system capable of actually recovering costs (Stalker and Komives, 2001). These often conflicting goals have significant political and economic implications. The effort to balance them is particularly challenging in developing countries and can lead to the implementation of price structures that do not help meet either goal and, in fact, have an adverse impact on poor consumers (Whittington, Boland, and Foster, 2002).

Like any business, utilities must recover their costs if they are to sustain their operations. Tariffs are the most common way of doing so. But tariffs serve other goals beyond raising revenues to cover all or part of costs. They also are used to ensure access across socioeconomic groups, to send price signals to users about the relationship between water use and water scarcity, and to ensure fairness in water service delivery (Cardone and Fonseca, 2003).

In developing countries, tariffs are controversial for many reasons. For policy makers, one objective can be more important than another, which can lead to the adoption of different tariff structures. The impact of such structures on consumers is ambiguous. Despite recent advances,[1] policy makers are not sufficiently informed of the effects on consumer behavior. A lack of competition in the water market implies that policy makers do not have a market test of whether a tariff structure is functioning effectively, with consumers unable to reject a tariff structure that is negatively impacting them (Whittington, Boland, and Foster, 2002).

In most developing countries, prices are usually set below full cost recovery for historical and political reasons, and there are implicit and explicit subsidies associated with the tariff structure. That is the conventional wisdom, but there has been insufficient focus on Africa to evaluate whether its water tariffs are meeting the desired goals. This paper looks at water and sanitation[2] tariffs in Africa, along with their relationship to cost recovery, cross-subsidies, and financial sustainability. Water tariff structures are measured against the criteria of cost recovery, efficiency, and equity. Questions include: do tariffs recover costs? are customers metered? are there cross subsidies between large and small consumers, public standposts, and private residential consumers? are water usage charges equitable, and are water connection charges fair?

The data presented in this paper represent tariffs for 45 water utilities from 23 countries in Africa, collected during 2006–07. Four of those countries (Cape Verde, Lesotho, Namibia, and South Africa) are considered middle-income countries (MICs); the rest are low-income countries (LICs). The tariffs are those that are currently enforced by the utilities (those approved but not yet enforced are not included), from which detailed descriptions of technical, financial, and governance performance were elicited. These data were collected in the context of the Africa Infrastructure Country Diagnostic (AICD) study,[3] which

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[1] For instance, the poverty and social impact analysis (PSIA) has been undertaken in many developing countries to understand the *ex ante* and *ex post* impact of tariff changes on consumer behavior.

[2] For utilities that provide wastewater services.

[3] For more information on AICD, please go to the project website, www.infrastructureafrica.org.

constitutes a major knowledge base designed to achieve a substantial improvement of data on infrastructure sectors in Africa. The AICD Water Supply and Sanitation (WSS) Survey Database, which includes indicators on institutional structure, sector performance, and tariff structures, is referred to throughout the text.

Utilities covered are (1) national in the countries where there is a single utility, and (2) regional or provincial where there are many service providers in a decentralized system. In the case of the latter, we tried to include only the three largest utilities in a given country. Except in Nigeria, which has 36 state utilities, the database represents either all or a major share of the urban service areas in the countries represented. Nine countries have a single supplier, and only four countries—Cape Verde, Chad, Madagascar, and Rwanda—have the same service provider for both water and electricity. All but six of the utilities in the database belong to countries that have experienced recent reforms in the sector. Interestingly, though private investment in WSS has been relatively limited in Africa, 30 utilities in the sample have experienced private sector participation in the past 15 years (annex A).

2 An overview of WSS tariffs in Africa

Water service costs include (1) an initial infrastructure and connection cost and (2) operations and maintenance (O&M) and rehabilitation costs. The first is considered fixed, and the second variable. Rehabilitation can be considered as the “enhanced maintenance” of assets that need to be replaced on a periodic basis in a well-functioning system (Kingdom and others, 2004). Production and O&M costs are typically recovered from water tariffs that, theoretically, can have either one part or two parts. One-part tariffs have either a fixed charge or a water-use charge, which may be uniformly volumetric, a block tariff (increasing or decreasing), or an increasing linear tariff. The two-part tariff generally comprises both a fixed charge and a water-use charge (Whittington and others, 2002). The consumer has no control over the fixed charges, which can be exogenously determined by pipe size, location, number of rooms, and so on. The volumetric tariff, which is based on water use, usually takes the form of an increasing block tariff (IBT). Linear tariffs and flat charges are rarely used.

The structure of metered water tariffs

The IBT has long been a common structure in developing countries. Under it, unit prices in the lower brackets of consumption (expressed in cubic meters per month) tend to be lower than the prices in higher brackets. In theory, the IBT allows utilities to meet the goals of efficiency and equity. Lower-consumption bands are priced at a low level (sometime even at 0), or subsidized heavily to allow low-volume consumers to take advantage of infrastructure services. It is believed that the poor who are connected to the network have lower levels of consumption, and that by reducing prices for the lower brackets of consumption, the service is made more affordable to the poor. At the other end, high-volume consumers pay a higher price, which is expected to be closer to the long-term marginal cost (Olivier, 2006).

Many countries in Africa have adopted a two-part tariff structure, which incorporates both a fixed and a water-use charge. Two-part tariffs aim to recover both production and administrative costs (such as billing and meter reading) from the fixed part of the tariff, while the water-use part covers partial O&M costs. The fixed-cost element of the two-part tariff allows the recovery of investment costs without distorting price signals. Two-part tariffs are designed to simultaneously meet economic efficiency and cost-recovery goals (Whittington, Boland, and Foster, 2002).

About 14 utilities have designed a two-part tariff, including 13 that enforce a "fixed charge + IBT"; only NWSC in Uganda imposes a "fixed charge + linear tariff" structure. (The names of the surveyed utilities are spelled out in the list of acronyms and abbreviations on page v.) In addition to these utilities, seven utilities have a "minimum consumption + IBT" structure. Among the remaining 24 utilities, there is an interesting variety. Nineteen impose an IBT structure. Three enforce a linear structure, which means that households pay the same price per unit of consumption. These are FCT WB in Nigeria, and the NWC in South Darfur and the Upper Nile in Sudan. Two other utilities have a different tariff structure. The CRWB in Malawi charges a flat fee or fixed charge for the first 32 units of consumption, and the KIWASCO in Kenya has a U-shaped structure in which tariffs decline after the first block and rise again after the third (figure 1B and annex B).

The block structure can add to the complexity of tariffs. It can range from one block (linear) to seven, with the average being just above three blocks. Only four utilities have a single-block (or linear) tariff. At the other extreme, Drakenstein in South Africa has seven. Electrogaz in Rwanda, and Johannesburg and Tygerburg in South Africa, have a six-block water tariff structure. The MIC average is just above four blocks, while the LIC average is just under three. The most common is a three-tiered block structure; 16 utilities fall into this category. This is followed by a four-block structure; 10 water utilities in Africa exercise this tariff structure (figure 1A).

Figure 1A. Number of blocks

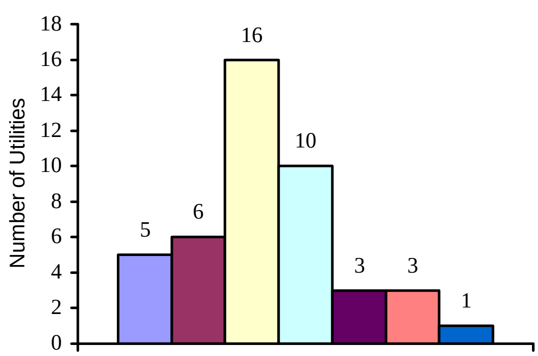
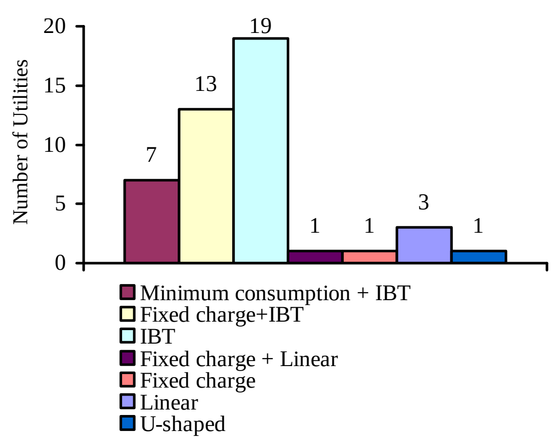


Figure 1B. Type of tariff structure



Source: AICD WSS Survey Database, 2007.

Fixed charges can take two forms: a minimum consumption charge, and a monthly fixed fee. The monthly fixed fee is evident in about 13 of the sampled water utilities in Africa. This fee is usually based on pipe size (which varies). The lower end of the range, corresponding to the usual residential pipe size of 15–20 millimeters (mm), is considered. In countries such as Benin, Cape Verde, Chad, the Democratic Republic of Congo (DRC), Ethiopia, Ghana, Nigeria, Kenya, Sudan, Rwanda, and Senegal, none of the utilities impose fixed charges on the water bill. The other mode of fixed fee is a monthly minimum charge for a fixed amount of consumption. This charge is levied to cover the fixed part of the O&M cost. Seven utilities have this charge; in all cases, the charge includes consumption of, at most, 10 cubic meters (m^3). SODESI in Cote d'Ivoire and BWB in Malawi levy a minimum consumption charge for less than 10 m^3, with the lowest volume of 5 m^3 enforced in BWB. In the five utilities in Mozambique, the minimum consumption is 10 m^3, regardless of actual consumption.

The size of the first block can vary. In most countries, it is usually below 10 m^3; only nine utilities have designed a first block that is higher than 10 m^3. Only 16 utilities have a first block that is less than 6 m^3/month, considered almost subsistence consumption. At the other extreme are utilities with a large consumption spread in the first block. In Kaduna and Katsina, for instance, the first block captures consumption of up to 30 m^3. Similar are the GWCL, NWC Khartoum, SDE in Senegal, and MWSA in Tanzania, where the first block is more than 20 m^3. The size of the last block also reveals interesting patterns. The last block can start from 5 m^3, for instance in the SONEB in Benin or the DAWASCO in Tanzania. It can also start at 1,000 m^3, as it does in Drakenstein, South Africa, or Katsina, Nigeria. Interestingly, the tariff structure in Drakenstein has seven blocks, and Katsina has only three blocks. In 29 or 64 percent of the utilities, the starting point of the last block is less than or equal to 50 m^3 (table 1, annexes C and D).

Table 1. Structure of tariffs implemented by water utilities, 2007

Utility	Type of tariff	Metering ratio (%)	Minimum con-sumption (m^3)	Fixed charge	Number of blocks	Size of 1st block (m^3)	Size of nth block (m^3)	Price of 1st block ($)	Price of nth block ($)
SONEB	IBT	89.1	0	n	2	5	5+	0.41	0.85
ONEA	IBT	98.2	0	y	3	6	30+	0.39	2.13
ELECTRA	IBT	91.2	0	y	5	7	20+	0.00	1.20
STEE	IBT	—	0	n	3	8	300+	2.67	4.67
REGIDESO	IBT	28.2	0	n	4	10	40+	0.05	0.12
SODESI	IBT	100.0	9	n	3	7	20+	0.19	0.42
AWSA	IBT	—	0	n	4	5	30+	0.26	0.44
ADAMA	IBT	90.1	0	n	4	5	50+	0.14	0.34
Dire Dawa	IBT	—	0	n	2	20	20+	0.52	0.73
GWCL	IBT	—	0	n	4	10	60+	0.18	0.52
NWASCO	IBT	—	0	n	5	10	60+	0.60	0.60
KIWASCO	U-shape	58.2	0	y	4	5	24+	0.29	1.18
WASA	IBT	98.2	0	y	2	10	10+	0.03	0.08
Beira	IBT	99.9	10	y	3	9	30+	0.00	0.66
Maputo	IBT	98.2	10	y	3	9	30+	0.00	0.71
Nampula	IBT	100.0	10	y	3	9	30+	0.00	0.58
Pemba	IBT	99.1	10	y	3	9	30+	0.00	0.57
Quelimane	IBT	100.0	10	y	3	9	30+	0.00	0.57
JIRAMA	IBT	97.1	0	y	1	10	30+	0.30	0.61
LWB	IBT	98.1	0	y	3	4	40+	0.00	0.52
BWB	IBT	22.6	5	n	0	0	0	0.00	0.00
CRWB	Flat	—	0	n	4	15	85+	0.71	3.48
Walvis Bay	IBT	100.0	0	y	3	6	45+	0.80	2.46

Utility	Type of tariff	Metering ratio (%)	Minimum con-sumption (m^3)	Fixed charge	Number of blocks	Size of 1st block (m^3)	Size of nth block (m^3)	Price of 1st block ($)	Price of nth block ($)
Windhoek	IBT	—	0	y	4	6	40+	1.01	1.94
Oshakati	IBT	96.5	0	y	3	10	40+	0.26	0.92
SEEN	IBT	96.8	0	n	1	0	0	0.39	0.39
FCT WB	Linear	23.6	0	n	2	30	30+	0.16	0.19
Kaduna WB	IBT	16.1	0	n	3	30	1000+	0.19	0.28
Katsina WB	IBT	6.5	0	n	6	5	500+	0.44	1.09
Electrogaz	IBT	98.7	0	n	4	20	60+	0.37	0.73
NWC Khartoum	IBT	—	0	n	1	0	0	0.64	0.64
NWC South Darfur	Linear	—	0	n	1	0	0	0.59	0.59
NWC Upper Nile	Linear	0.0	0	n	3	20	40+	0.37	1.46
SDE	IBT	117.3	0	n	2	15	15+	0.22	0.47
DAWASCO	IBT	70.5	0	n	2	5	5+	0.39	0.52
DUWASA	IBT	27.9	10	y	3	14	25+	0.00	0.51
MWSA	IBT	100.0	0	y	3	24	75+	0.24	0.28
NWSC	Linear	94.5	0	y	1	0	0	0.65	0.65
Drakenstein	IBT	60.7	0	y	7	6	1000+	0.00	1.86
Tygerberg	IBT	60.3	0	y	6	6	50+	0.00	1.86
eThekwini	IBT	66.4	0	y	3	6	30+	0.00	1.77
Johannesburg	IBT	52.4	0	n	6	6	40+	0.00	1.40
SWSC	IBT	—	6	n	4	10	50+	0.30	0.47
LWSC	IBT	33.3	0	y	5	6	170+	0.25	0.55
NWSC	IBT	—	0	n	4	6	50+	0.25	0.37
MIC average	78.2				4.4			0.23	1.50
LIC average	66.4				2.9			0.34	0.80

Source: AICD WSS Survey Database, 2007.
Note: MIC = middle-income countries; LIC = low-income countries.
— = data not available.

Developing countries have often used the price of a first block as a social tariff or lifeline, so that the poor can have access to at least a minimum quantity of safe water at a subsidized price. Most of the policy debates over the impact of tariffs on equity revolve around this issue and whether it is actually serving the poor. The average price of the first block in African water utilities is about $0.32/m^3. About 20 utilities charge less than $0.20/m^3 for the first block. South Africa is unique in that it has a free water policy, with the first 6 m^3 delivered at no charge. This gives small consumers the opportunity to meet their minimum consumption needs for free. (It is also the reason why the average first-block tariff shown in table 1 is lower in the MICs than in the LICs.)

ELECTRA in Cape Verde is an outlier, with the first-block tariff amounting to $2.7/m^3, followed by Oshakati in Namibia, which has a first-block tariff of just above $1/m^3. In a number of countries with a minimum consumption charge—such as Cote d'Ivoire, Malawi (BWB), and Mozambique—the block structure begins with block two, and the price of block one is therefore zero.

The price of the last block in an IBT structure is often set with an eye on cost recovery and water conservation. In about one-third of utilities, the tariffs are set higher than $0.8/m^3: of these, 13 have last-block prices of more than $1. ELECTRA, ONEA, Walvis Bay, and Windhoek have adopted a last-block tariff of more than $2/m^3. The fixed charges, which are expected to be paid every month irrespective of consumption, are usually set at less than $4. Of the 20 utilities that enforce a fixed-fee or minimum-consumption charge, about half are set between $2 and $4. Only eThekwini in South Africa charges a fixed fee of more than $4.

Figure 2A. Price of first block ($/m^3)

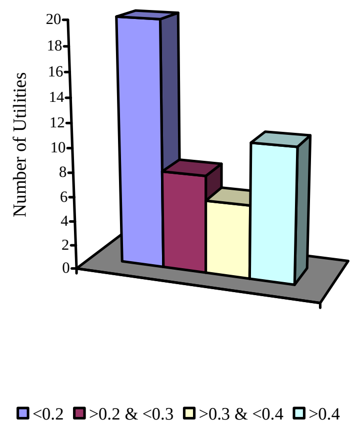


Figure 2B. Price of nth block ($/m^3)

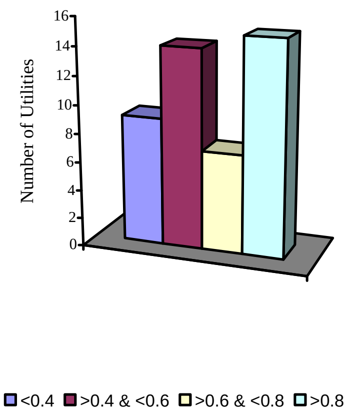
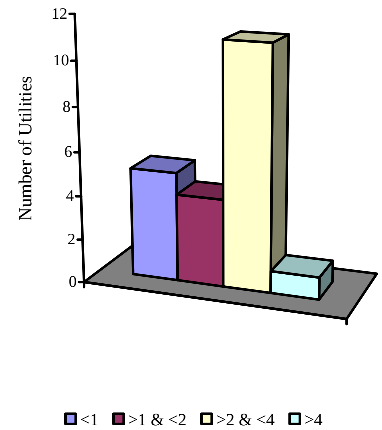


Figure 2C. Fixed charges ($)



Source: AICD WSS Survey Database, 2007.

Structure of unmetered water tariffs

In Africa, water metering is surprisingly widespread, with many utilities reporting 100 percent metering in their service areas. Nine utilities have implemented operating meters for all residential and nonresidential connections. For 35 utilities for which detailed information is available, the average metering ratio is 75 percent. Other utilities, including those in Nigeria and Sudan, have almost negligible or no metering. Most others fall somewhere in between. Those households without meters, however, can escape water utilities' enforcement mechanism, resulting in revenue losses. To capture the cost of unmetered customers, a fixed charge is typically levied on a monthly basis (table 2).

Structure of nonresidential water tariffs

Table 2. Structure of unmetered tariffs

Utility	Country	Type of tariff	Fixed charge ($)	Connection fee ($)
GWCL	Ghana	Fixed charge	3.11	235.29
FCT WB	Nigeria	Fixed charge	3.14	15.68
Kaduna WB	Nigeria	Fixed charge	10.59	55.41
Katsina WB	Nigeria	Fixed charge	5.45	n.a.
SWSC	Zambia	Fixed charge	12.16	50.00
LWSC	Zambia	Fixed charge	7.84	n.a.
NWSC	Zambia	Fixed charge	6.53	235.29

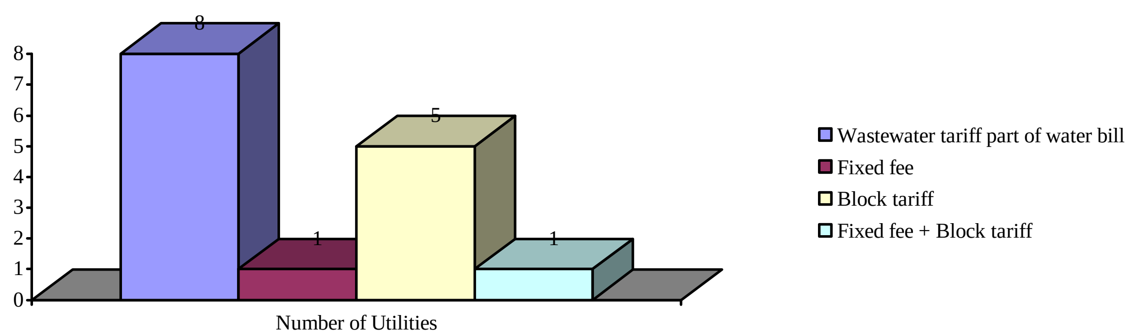
Source: AICD WSS Survey Database, 2007.
n.a. = not applicable.

The average industrial price for the first block is $4.5/m^3$; the commercial price is about $3.7/m^3$; and the government and institutional price is about $3.9/m^3$, with a median commercial tariff of around $0.75/m^3$. These prices are driven by utilities that charge exorbitant tariffs, such as those in Mozambique, Oshakati, and Dodoma. In Mozambique, for instance, minimum consumption of up to 25 m^3 is enforced, at a price of about $16. The effective cost is reduced to about $4/m^3$ only when nonresidential consumers use about 100 m^3, an average consumption level for industrial and commercial customers. About 17 utilities enforce a linear commercial tariff, and the rest have adopted an IBT structure. About 21 utilities levy the same charge on industrial, commercial, and government consumers (annex E).

Structure of wastewater tariffs

The majority of Africans use on-site sanitation to meet their basic needs, as sewerage facilities are very limited. The responsibility of providing sewerage services may rest with water utilities or the government. Only in Senegal does a separate sanitation utility (ONAS) provide these facilities to the population. Of the 45 utilities in the sample, 18 do not have any wastewater responsibility. The structure of payment for sanitation varies; it can either be part of the water bill, calculated as a percentage, or it can be a block or fixed-tariff structure. In the case of eight utilities, the sanitation charge is levied as part of the water bill, which can range from 30 percent in Zambia to 85 percent in Lesotho, with an average of 53 percent. Oshakati enforces a fixed charge, and Walvis Bay levies both a fixed charge and a block tariff structure (figure 3 and annex E).

Figure 3. Wastewater tariff structures



Source: AICD WSS Survey Database, 2007.

The block tariff structure for sewerage is evident in six utilities in Africa, and the number of blocks can vary between one and five. ONEA in Burkina Faso and AWSA in Ethiopia maintain only one tariff block (a linear tariff), and households pay the same effective price irrespective of consumption. At the other extreme is KIWASCO in Kenya, which enforces a five-block tariff structure. Walvis Bay in Namibia has a block tariff in which prices decline with rising blocks. A specific connection fee for sewerage is found in eight utilities. In other cases, it may be implicitly accounted for by the water-connection fee for utilities that have a wastewater responsibility. Among the utilities that have a block tariff structure, only KIWASCO in Kenya levies a connection fee of $90 (table 3 and annex F).

Table 3. Structure and level of wastewater tariffs

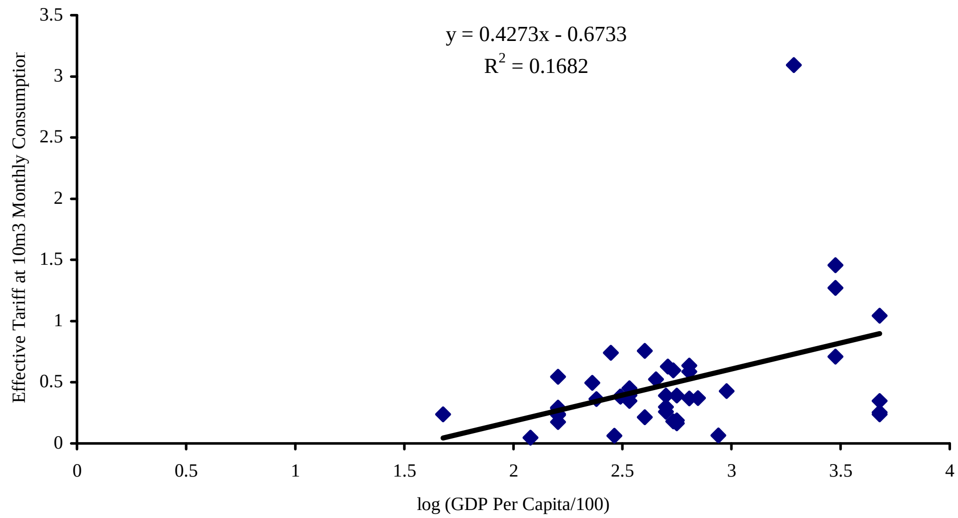
Utility	Country	Type of tariff	Connection fee	Fixed charge	Number of blocks	Size of 1st block	Size of nth block	Price of 1st block	Price of nth block
ONEA	BFA	Flat	n.a	0	1	0+	n.a.	0.04	0.04
AWSA	ETH	Flat	n.a	0	1	7.1+	n.a.	0.07	0.07
NWASCO	KEN	IBT	n.a	0	4	0–10	60+	0.13	0.21
KIWASCO	KEN	IBT	$90	0	5	0–10	60+	0.21	0.42
Walvis Bay	NAM	DBT	n.a	$2.69	4	0–15	85+	0.34	0.02
ONAS	SEN	IBT	n.a	0	3	0–20	40+	0.02	0.13

Source: AICD WSS Survey Database, 2007.
n.a. = not applicable.

Cost of water and overall economic development

Water costs appear to be positively correlated with countries' overall level of economic development (figure 4). The coefficient of the relationship is estimated to be 0.42. Cost per cubic meter at an average consumption of 10 m^3 increases as the country's gross national income (GNI) per capita increases, which is expressed by an upward slope. The countries in the sample include the LICs and countries—such as South Africa, Cape Verde, Lesotho, and Namibia—that have a GNI per capita of more than or close to $1,000. These extreme cases may disproportionately push up the slope. For instance, GNI per capita in South Africa is much higher than in other countries—for example, it is more than 40 times that of the DRC, the lowest-income country in the group. But even if the utilities in South Africa, Cape Verde, and Namibia are excluded from this group, the relationship would still remain positive, though the slope would decline.

Figure 4. Cost of water and GNI per capita



Source: AICD WSS Survey Database, 2007; World Development Indicators (WDI), 2007.

3 Do tariffs recover costs?

Cost-recovery policies in African utilities

New demographic trends have made the challenge of meeting service-delivery objectives acutely felt in Africa; consequently, the drive toward cost recovery is even more urgent. Population numbers in the service areas of utilities and operators are continuously increasing, often in periurban areas because of rising trends in urbanization. To service previously unserved areas and to maintain existing connections on a sustainable basis requires investment in new networks and the maintenance of existing systems at least partially funded by the internally generated revenues of service providers. From the supply side, service providers need to recover costs by imposing and collecting consumer tariffs in order to be financially sustainable. Enforcing cost-recovery tariffs enables utilities to leverage resources from other sources—donors and, particularly, the private sector. From the demand side, the ability of consumers to pay tariffs influences the capacity of utilities to be financially capable of expanding access and ensuring service quality.

Recovering the cost of providing service, at least for O&M, is a stated objective of water utilities around the world. The majority of African countries also report that their water tariffs are set with the goal of cost recovery. Only Chad reports that tariffs are set without a specified cost-recovery mandate. Benin also states that there is no specified tariff policy, although in practice the utilities aim to recover O&M costs, plus some investment costs. Including Benin, 19 countries are expected to fully recover O&M costs as well as some amount of investment costs through tariffs. Two countries (Sudan and Ghana) indicated that there was no requirement to recover investment costs, only O&M. In the case of urban wastewater, no country requires covering any part of the investment cost. For the 10 utilities for which information is available, seven expect all O&M to be recouped, and three require only partial O&M costs to be met (table 4).

Table 4. Cost-recovery policy for WSS

Sector	Countries (%)	Sector	Countries (%)
Urban Water		Urban Wastewater	
Existence of cost-recovery policy	91 (21)	Existence of cost-recovery policy	55 (10)
Cost-recovery policy		Cost-recovery policy	
All O&M and some investment	83 (19)	All O&M and some investment	0 (0)
All O&M and no investment	8 (2)	All O&M and no investment	39 (7)
Partial O&M and no investment		Partial O&M and no investment	16 (3)
Cost shortfall met by			
Central government	52 (12)		
Regional government	13 (3)		
Local government	4 (1)		
Donors	13 (3)		
Others	22 (5)		

Source: AICD WSS Survey Database, 2007.

The burden of covering operating shortfalls is shared among government levels and donors, sometimes with more than one contributing stakeholder. Twelve countries reported that the central government is responsible, while four (Ethiopia, Malawi, Nigeria, and Sudan) saw a responsibility at the regional and local government level. Kenya, Lesotho, and Zambia responded that donors have a shared responsibility. Interestingly, only 12 of 24 countries stated that costs and revenues related to the provision of water services were ring-fenced. It is not clear whether this is because ring-fencing is not being effectively implemented, or whether institutional arrangements make it impossible to isolate and track the costs and revenues related to water services. The ring-fencing of costs is even more difficult for wastewater—only nine utilities reported that revenues and costs are specifically related to the provision of wastewater systems.

Structure of O&M costs

To measure whether tariffs reflect market conditions, it is important to understand the nature of service-provision costs. While piped-water and wastewater systems bring productivity, health, and environmental benefits, these cannot be quantified; this section only focuses on the financial recovery of the capital and O&M cost. The tariffs imposed on consumers can be compared against the average cost of production to arrive at the exact degree of cost recovery. Therefore, an operational cost-recovery target for African utilities should ideally emerge from financial and technical performance data.

There have been two recent sources of utility performance data in Africa. First, the International Benchmarking Initiative (IBNET) collected operational cost data for water and wastewater systems in Africa. The unit cost of water sold by African utilities ranges between \$0.30/m^3 in 2001 to \$1.10/m^3 in 2005 (IBNET, 2007). The number of utilities reporting this information is, however, different each year, and the 2005 cost is representative of only South African utilities. The IBNET data were also used by Kingdom and others (2006), who used the cost of 41 Asian, East European, and African utilities to arrive at acceptable cost-recovery thresholds. The average O&M cost/m^3 was reported as 0.30/m^3, with the estimates for African utilities being \$0.34/m^3. Rehabilitation and renewal costs, in addition to the average O&M cost, would amount to \$0.35/m^3. Second, the AICD WSS Survey Database (2007) collected information on operational expenses per unit of water produced and sold for about 53 water utilities in Africa. This survey contains information on reported annual O&M costs, and annual production and consumption, which is used to arrive at the O&M cost/m^3 from 2002 to 2005. The operational expense per unit of water produced and sold is estimated to be \$0.41/m^3 and \$0.62/m^3 respectively in 2005, and has continually increased in nominal terms since 2002. Two-thirds of utilities operate within the operating cost band of \$0.4/ m3–\$0.8/m^3 (annex G).

Figure 5A. O&M cost/m^3, 2002–05

Nominal US dollars

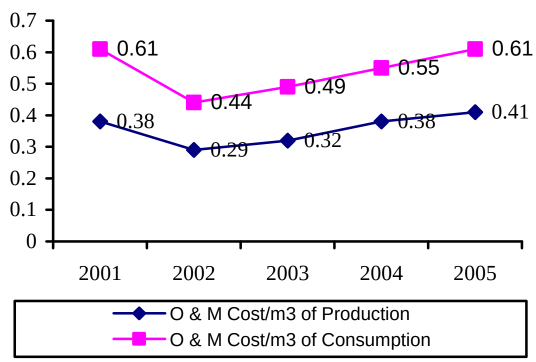
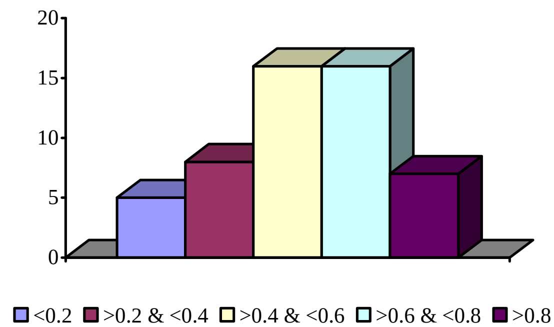


Figure 5B. O&M cost/m^3 of consumption, 2005

US dollars



Source: AICD WSS Survey Database, 2007.

The average O&M cost/m^3 is driven by the high cost (more than \$1) of providing services in MICs, including South Africa and Namibia. In fact, in Windhoek, the operating cost of each unit of water is more than \$2. The average O&M cost/m^3 for utilities in MICs is \$1.16/m^3, and in LICs it is \$0.48m^3. The internationally acceptable threshold of \$0.4/ m3 for cost recovery of O&M using Global Water Intelligence (GWI) reports is a rather conservative estimate for Africa (Foster and Yepes, 2006). In summary, two levels of operating cost-recovery thresholds are used in the rest of this paper: the GWI O&M cost threshold of \$0.4/m^3, and the AICD actual O&M cost/m^3 for each utility.

Arriving at capital cost estimates is more complicated. Kingdom and others (2004) estimate that capital costs in addition to O&M and rehabilitation costs would be \$0.91/m^3. This is based on an average consumption of 60 liters per capita/day, an average capital cost of \$120 per capita, and a lifetime asset use of 20 years. The per capita cost of \$12.22 is arrived at using the above assumptions, at an 8 percent discount rate. Foster and Yepes (2006) use a similar figure of \$0.8/m^3 from GWI as an internationally acceptable benchmark for partial capital-cost recovery to evaluate cost recovery in Latin America.

Meeting the actual O&M cost is achieved in many utilities in Africa. Of the 38 utilities for which detailed O&M cost information is available from the AICD WSS Survey Database, about 22 meet the cost with an average consumption of 10 m^3. Similarly, a high proportion of African water utilities meet their O&M cost at the GWI cost-recovery threshold.[4] Out of the 45 African utilities under consideration,

[4] The scope of this paper is limited to analyzing the possibility of tariffs to cover costs, and not whether the utilities are actually raising the revenues to meet the costs. That is, the collection ratio and enforcement mechanisms are not explored in this study.

17 have average tariffs (calculated at 10 m^3) higher than $0.40/$m^3$, and only four utilities have a tariff more than $0.80/$m^3$, which is high enough to cover O&M and partial capital cost. These four utilities that enforce a tariff of more than $1 are in South Africa, Namibia, and Cape Verde—all MICs. Cost recovery is much more evident in nonresidential tariffs. About 20 utilities enforce a commercial tariff of more than $0.8/$m^3$ in the first block. About 95 percent of the utilities charge a price of more than the O&M cost-recovery threshold of $0.4/$m^3$, at an average commercial consumption level of 100 m^3 (table 5).

Table 5. GWI cost-recovery thresholds

Threshold	African utilities	% of utilities achieving the threshold (average residential consumption = 10 m^3)	% of utilities achieving the threshold (average commercial consumption = 100 m^3)
<US$0.20/ m3	Tariff *insufficient* to cover basic operating and maintenance costs	16	3
US$0.20–0.40/ m3	Tariff *sufficient* to cover operating and some maintenance costs	49	3
US$0.40–1.00/ m3	Tariff *sufficient* to cover operating, maintenance, and most investment needs	27	24
>US$1.00/ m3	Tariff *sufficient* to cover operating, maintenance, and most investment needs in the face of extreme supply shortages	9	71

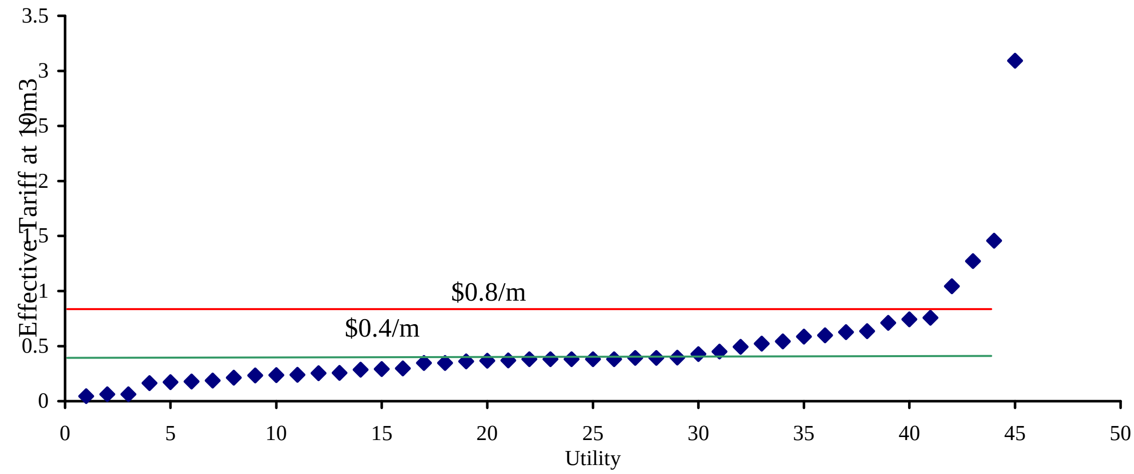
Source: GWI, 2004; Foster and Yepes, 2006; Kingdom and others, 2006; AICD WSS Survey Database, 2007.

More utilities are able to cover costs at extremely low or extremely high levels of consumption than at average levels. Though the capital cost figures vary based on the assumed consumption levels, it is still useful to compare cost recovery across different consumption blocks (figure 6). The degree of cost recovery decreases from 58 percent at 4 m^3, to 38 percent at 10 m^3, and rises to 64 percent at 40 m^3. At even a higher consumption of 50 m^3 per month, 12 utilities cover O&M and partial capital costs compared to 10 utilities at 40 m^3. It is clear that households at the low and high ends of consumption are contributing more to cost recovery than the average consumer (annex H).

Many utilities do not meet their investment cost threshold levels even at the highest block prices. The expectation of an IBT is that the prices at higher blocks will reflect the marginal cost of water provision. Not surprisingly, the highest block tariff is more successful in meeting the O&M cost than the capital cost in many utilities. Only nine utilities are unable to meet O&M expenses, while the same is true for capital cost of 30 utilities. All seven utilities represented from South Africa and Namibia realize investment costs at the highest block tariff levels; other utilities that achieve this are in Cape Verde, Benin, Niger, Rwanda, Senegal, Burkina Faso, Lesotho, and Cote d’Ivoire.

In sum, the experience of recovering WSS operating costs in Africa is positive, with many utilities setting tariffs at levels high enough to recoup O&M costs. The performance of African utilities is superior to that found elsewhere in the world. For instance, in Latin America and the Caribbean (LAC), which has the best record among developing countries, the degree of partial O&M cost recovery is only 38 percent (Foster and Yepes, 2005). In Africa, the tariff structures are designed in a way more conducive to meeting O&M costs at the high or low ends of consumption. At the highest block levels, 80 percent of the utilities are able to regain operating costs.

Figure 6. Utilities meeting cost-recovery thresholds



At 4m^3, % of utilities meeting	
GWI O&M cost ($0.4/m^3)	58 (26)
AICD O&M cost (utility specific)	53 (20)
GWI capital cost ($0.4/m^3)	29 (13)
At 10m^3, % of utilities meeting	
GWI O&M cost ($0.4/m^3)	36 (16)
AICD O&M cost (utility specific)	34 (13)
GWI capital cost ($0.4/m^3)	9 (4)
At 40m^3, % of utilities meeting	
GWI O&M cost ($0.4/m^3)	64 (29)
AICD O&M cost (utility specific)	58 (22)
GWI capital cost ($0.4/m^3)	20 (9)

Source: AICD WSS Survey Database, 2007.

4 Do tariffs provide efficient price signals?

An efficient tariff structure involves setting prices that signal the marginal benefits of water use to consumers. Prices should therefore encompass not only financial costs, but also the externalities that the use of water imposes on the economy and environment. A well-designed, efficient tariff guarantees the highest aggregate benefits for the marginal cost of supplying water (Whittington, Boland, and Foster, 2002).

The efficiency of tariff structures is evident from a number of attributes. First, metering that precisely estimates water use encourages frugality. The official estimates of metering are relatively high in African utilities, with many reporting more than 90 percent metering in their service areas. But the extent of functioning and the evidence of meter tampering are not known. Second, fixed-fee or minimum consumption charges are applicable in half the water utilities in Africa, and usually complemented by a volumetric charge. This fixed fee can usually vary from $1 to $4 per month irrespective of the volume of water used. While the volumetric charge is dependent on water consumption, the fixed fee does not provide any incentive to consumers to be frugal in water use. Fixed charges, operated in an era of increasing water use—often associated with rising population and incomes—can lead to stagnation of revenues, with a consequent impact on efficient utility functioning (Whittington, Boland, and Foster, 2002). Third, the IBT structures achieve efficiency by meeting the long-run marginal cost (LRMC) at the higher levels of consumption. An IBT structure would closely match the increasing marginal cost curve that rises with higher consumption. The price at the highest block is sufficiently high enough to meet the capital and O&M cost threshold in about 15 African water utilities. The nonresidential tariffs are usually set higher than residential tariffs, and the block structure is designed to recuperate the investment costs at least at the highest block. In some countries—particularly, in South Africa, Namibia, and across some utilities in Nigeria—the highest tariff block is substantially higher that the investment cost threshold, suggesting a negative impact on the cost structure of such commercial and industrial entities. These enterprises, in an attempt to control infrastructure input costs, would be better off with self-supply.

In summary, relatively high levels of metering and tariffs in Africa suggest that consumers are sent efficient price signals on water use. On the other hand, the use of fixed costs by some utilities can lead to inefficient resource use. But the necessity of water demand management is relatively less important in Africa. Most consumers in Africa survive on almost subsistence quantities of water. The situation in Africa is exactly opposite to that in South Asia, with its low levels of metering and tariffs, which send consumers distorted signals on the value of water.

5 Are tariffs equitable?

Threshold consumption levels can be used to compare tariff structures across countries in Africa. Though consumption varies across households in different countries, the tariff levels at these approximate estimates can be computed to understand how small, medium, and large consumers compare with respect to payment for water. The World Health Organization (WHO) has set a per capita consumption of 25 liters/day as minimum consumption for survival. The average and maximum consumption is derived from a recent survey by the Water Utility Partnership (WUP) in 2002. The consumption levels for a family of five can range from 4 m^3/month at the subsistence end, to 40 m^3/month at the high end; 10 m^3/month can be considered average consumption. These three consumption levels will be used to compare effective tariffs and the degree of cross-subsidization among different categories of consumers.

Table 6. Categories of residential consumers

Household consumption	Liters/capita/day	Household size	Approx. m^3/month
Minimum/small	25	5	4
Average/medium	60	5	10
Maximum/large	250	5	40

Source: WHO; SPBnet (WUP), 2002.

The tariff at a consumption of 10 m^3 is about $0.49/$m^3$ in Sub-Saharan Africa (table 7), and the median at this level is $0.38/$m^3$. ELECTRA in Cape Verde is clearly an outlier, with tariffs amounting to above $3 for a consumption level of 10 m^3. This is due to desalination, which raises the production cost of water. If Cape Verde is excluded, the average tariff is $0.43/$m^3$. The tariff levels in Africa are comparable to the average in LAC, which at $0.41/$m^3$ at an average consumption of 15 m^3 is considered higher than other regions in the world, such as East Asia, Eastern Europe, and the Middle East. South Asian water tariffs are the lowest in the world, with an observed average tariff of only $0.09/$m^3$. The average developing country tariff is less than half the average tariff of countries in the Organisation for Economic Co-operation and Development (OECD).

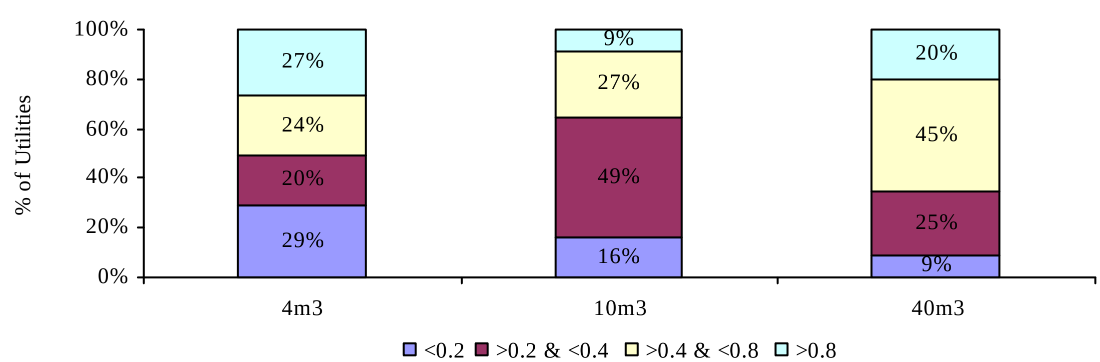
Table 7. Comparison of water tariffs in Sub-Saharan Africa and other regions ($\$/m^3$)

Sub-Saharan Africa	4 m^3	10 m^3	15 m^3	40 m^3
Average	0.55	0.49	0.52	0.65
Median	0.41	0.38	0.40	0.51
Comparable tariffs (average consumption = 15 m^3)				
OECD			1.04	
Latin America and the Caribbean			0.41	
Middle East and North Africa			0.37	
East Asia and Pacific			0.25	
Europe and Central Asia			0.13	
South Asia			0.09	

Source: AICD WSS Survey Database, 2007; Foster and Yepes (2006).

The average price at the minimum consumption of 4m^3 is higher than at 10 or 15m^3, and lower than the price at the high-end consumption level of 40 m^3. In fact, excluding ELECTRA, the average prices at 4 m^3 and 40 m^3 is almost the same (figure 7). At the minimum consumption of 4 m^3, the average tariff across the 45 utilities is $\$0.55/m^3$, and $\$0.50/m^3$ excluding ELECTRA. At 4 m^3, two utilities in Namibia—Windhoek and Oshakati—have effective prices of more than $1, besides ELECTRA, and six utilities have tariffs very close to $1. The number of utilities that enforce an effective tariff of more than $\$0.8/m^3$ is highest at the consumption level of 4 m^3. At the average consumption level of 10 m^3, the majority of utilities impose a tariff between $0.4 and $\$0.8/m^3$. At the high-end consumption level of 40 m^3, very few utilities—REGIDESO in DRC, Kaduna WB, Katsina WB, and JIRAMA in Madagascar—have an effective tariff of less than $\$0.2/m^3$. The majority of utilities charge at least $\$0.4/m^3$ at this level of consumption (annex F).

Figure 7. Effective prices at different levels of household consumption ($)



Source: AICD WSS Survey Database, 2007.

Equity in water-connection charges

The costs of connecting to the network can prove to be a significant barrier to consumers in Africa. In the case of 26 utilities for which information on connection charges is available, these charges vary widely (figure 8A), from about $6 in the Upper Nile in Sudan to more than $240 in Niger, Mozambique, and Cote d'Ivoire. Connection charges are more than $300 in Drakenstein, eThekwani, and Johannesburg in South Africa. Even among the water utilities in the same country, connection costs can vary. For instance, in AWSA, Adama, and Dire Dawa —three utilities in Ethiopia, connection costs are $14, $9, and $43 respectively. A comparison with GNI per capita suggests that, in some countries, the connection charge is relatively expensive (figure 8B). On average across Africa, the connection charge is 28 percent of GNI per capita. In MICs such as South Africa and Namibia, though the connection cost is high, it is negligible compared to GNI per capita. On the other side are countries such as Niger, where the connection charge is more than 100 percent of the GNI per capita. Similarly, in the five water utilities in Mozambique, connection charges are more than 75 percent of the GNI per capita.

Figure 8A. Connection costs in SSA ($)

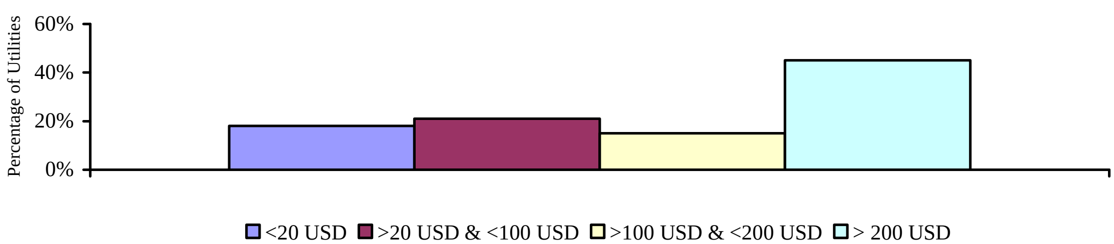
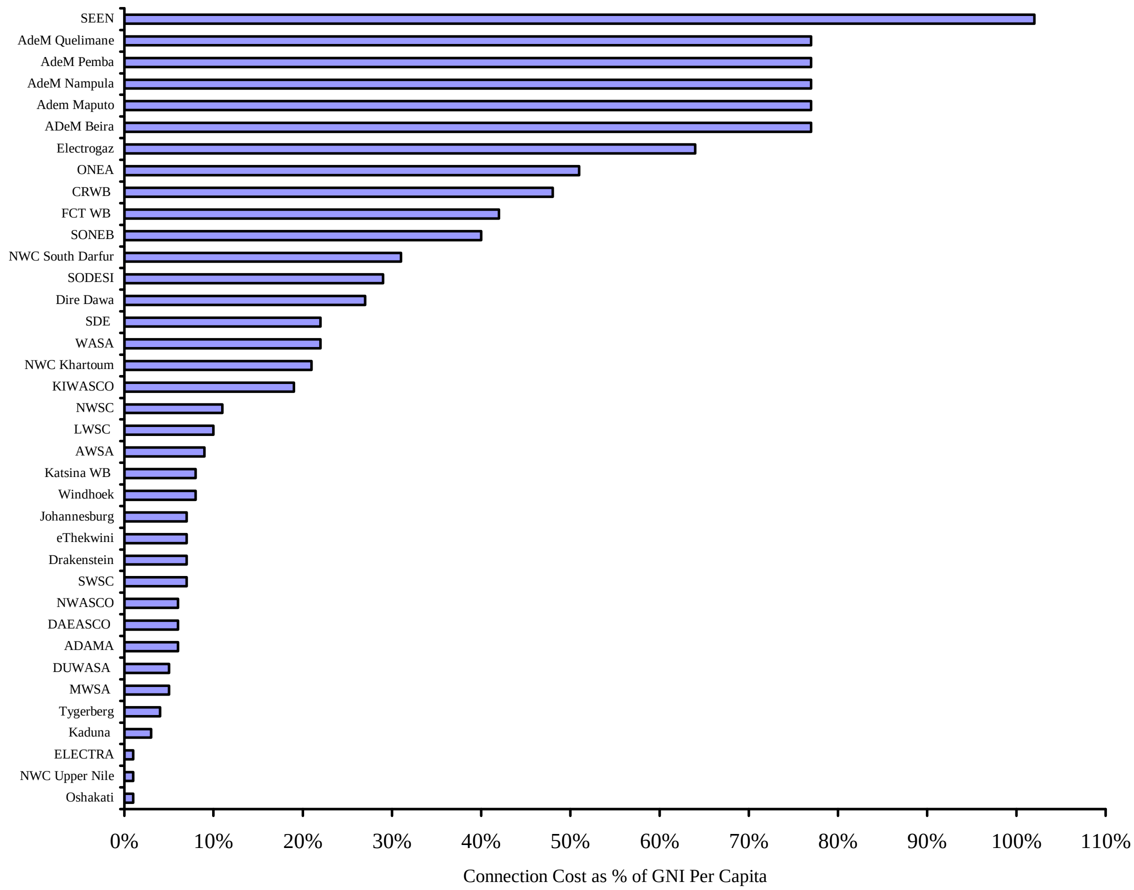


Figure 8B. Comparison of connection costs with GNI per capita

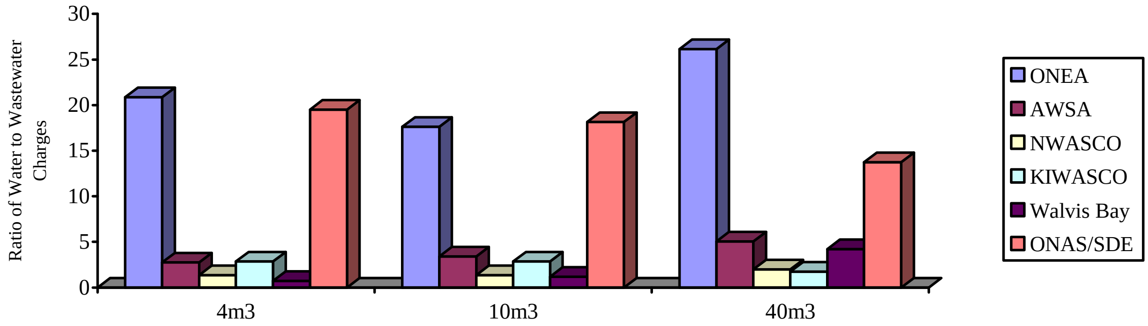


Source: AICD WSS Survey Database, 2007.

Cross-subsidies for water and wastewater consumers

Many African utilities are responsible for providing wastewater services in addition to water supply. Wastewater charges are either included in the water bill or imposed separately in the form of a fixed or block structure. For the utilities that enforce a block tariff structure, it is possible to compare water and wastewater prices at similar levels of consumption. The consumers of wastewater services are subsidized by water users (figure 9). In ONEA and ONAS, particularly, the water charges are several orders of magnitude higher than the wastewater charges.

Figure 9. Ratio of water and wastewater charges at different levels of consumption

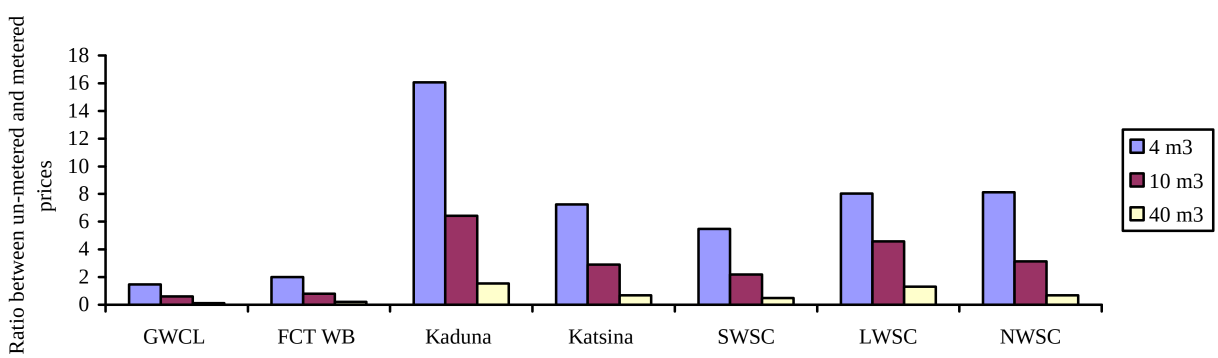


Source: AICD WSS Survey Database, 2007.

Cross-subsidies for metered and unmetered consumers

The high prevalence of metering implies a low incidence of unmetered rates, and is imposed as a fixed charge. The downside of the fixed charge is that households consuming a low volume of water end up paying a higher price, and consumers of high volumes of water pay a price that does not adequately reflect the true cost of the water used. For instance, in Ghana, consumers who survive on the minimum subsistence level of 4 m^3/month pay \$0.77/m^3, while those at the higher end of 40 m^3/month pay only \$0.08/m^3 (figure 10). This is also the case with other utilities in Nigeria that levy a fixed charge. Comparing metered and unmetered rates at the same levels of consumption suggests that, at the lower end, unmetered consumers are paying more. In Kaduna, for instance, the unmetered price at the subsistence consumption level of 4 m^3 is 14 times that of the metered rate. At the higher levels, the metered consumers pay more. At the high-end consumption level of 40 m^3, unmetered consumers pay slightly more than metered consumers only in Kaduna WB and LWSC.

Figure 10. Ratio of unmetered and metered rates at different levels of consumption

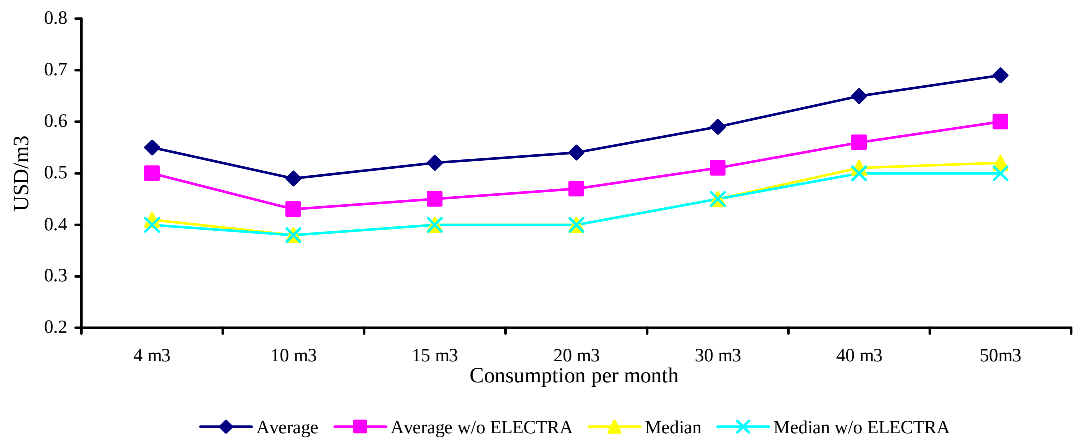


Source: AICD WSS Survey Database, 2007.

Cross-subsidies of small and large consumers

Average tariffs across different consumption levels in African utilities reveal the high price that small consumers are paying for water. To test whether small consumers pay lower prices than large consumers, we computed the water price per cubic meter at several consumption levels. The effective price sharply declines at the average consumption of 10 m^3, then rises again (figure 11). The price at the survival consumption of 4 m^3 is roughly comparable to the price at 20 m^3 of consumption.

Figure 11. Average water tariffs for Africa at different consumption levels



Note: ELECTRA is an outlier with high effective tariffs.
Source: AICD WSS Survey Database, 2007.

It is important to further discuss the merits of IBT in fulfilling its premise, as the majority of utilities in Africa use this type of tariff structure. First, the implementation of the IBT structure is based on the implicit assumption that small consumers are poor and large consumers will cross-subsidize the small ones. This assumed relationship between poverty and consumption is very important in evaluating the subsidy incidence of the IBT. Second, households in the higher-income bracket usually consume more water. Therefore, they are expected to pay more for the additional consumption. Third, a sufficiently high price in the last blocks discourages wasteful water use and enables households to conserve water. Fourth, charging low tariffs for small consumers brings a larger proportion of the population into the fold of network coverage, and therefore creates public health externalities generated by superior quality water (Whittington and Boland, 2003).

The IBT assumptions rest on the fact that all consumers are metered, so it is possible to exactly estimate their water consumption and bill them for it (Whittington and Boland, 2003). In Africa, though water metering is relatively high, it is still low in a few cities, such as those in Nigeria and DRC. Another problem is that housing is shared among many households in Africa, making it difficult to exactly estimate how much each household is consuming—though households devise ways of dividing the water bill based on household size, number of rooms, and so on. But since so many households are consuming a relatively large quantity of water, which falls in a higher block, the bill is consequently higher. The IBT structure, therefore, has an unintended consequence for poor households consuming piped water (Whittington, 1992). For these reasons, the use of IBT in meeting the goals of efficiency and equity has been questioned in recent years.

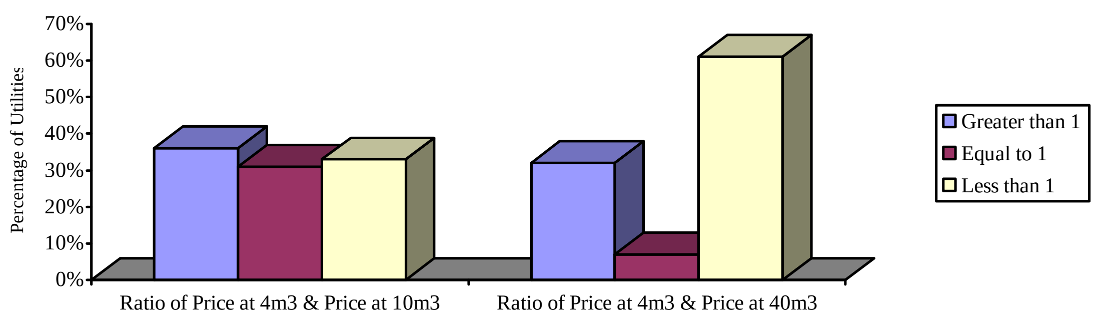
The two-part tariff structure, implemented in many utilities in Africa, can fail to favor small consumers because of two reasons. First, the fixed-fee and minimum consumption charges place an enormous burden on low-volume consumers. This is the part of the water bill they cannot control irrespective of their level of consumption. Komives and others (2005) compare the average price per m^3 of IBT, IBT with fixed fee, and IBT with fixed fee and minimum consumption charges, and find that low-volume consumers under the latter two-tariff regimes bear the burden of higher prices. Second, the arrangement of the block's size and price is important, particularly that of the first block. If the first block is wide, it not only allows leakage of the implicit subsidy to the nonpoor, but also leads to a higher price per m^3 for the low-volume consumers in the band.

In only a few countries in Africa do small consumers pay the lowest price. Among the 45 utilities in the sample, the effective price increases with rising consumption in 27 utilities (table 8). In the majority of utilities, high-end consumers pay more than low-end or average consumers. But inequity is more prevalent at the lower end of the consumption—among households consuming between 4 and 10 m^3/month. In almost three-fourths of cases, the consumers with water intake at the survival level pay equal or higher than the average consumers.

The tariff structures in Cote d'Ivoire, Malawi (BWB), and Benin most favor small consumers. In SODESI in Cote d'Ivoire, consumers at the survival level pay only \$0.04/m^3, which increases to about \$0.53/m^3 for large-volume consumers with intakes of 40 m^3. In Benin, average consumers pay 1.5 times more than small consumers, and large consumers pay more than twice the small consumers. The Ethiopian utilities, WASA in Lesotho, ELECTRA in Cape Verde, and DAWASCO in Tanzania also strongly favor the small consumer. Mozambique, Malawi (CRWB and LWB), Madagascar, and Tanzania (DUWASA) are the countries where the tariff strongly favors large consumers. In Mozambique, small consumers must pay 60 percent more than mid-level consumers, and more than 35 percent compared to large consumers. In Madagascar, small consumers have to pay 41 percent more than mid-level consumers and 30 percent more than large ones.

In 16 utilities, the effective tariffs of small consumers are higher than those of average consumers. This difference is pronounced in the case of five utilities in Mozambique. Since these utilities have a minimum threshold of 10 m^3, the small consumer whose water intake is about 4 m^3 pays on average about \$0.57 more than those consuming 10 m^3 and about \$0.40 more than those consuming 40 m^3. Therefore, it is not economical for households to consume less than the minimum threshold, as they end up paying more for consuming less water (Figure 12).

Figure 12. Utilities charging higher effective prices to small consumers



Source: AICD WSS Survey Database, 2007.

Fixed and minimum consumption charges have a significant impact on the unit price paid by the small consumers. With a fixed charge, small consumers usually have to pay a higher price per unit than large consumers. This is evident in Mozambique, which imposes a minimum consumption charge up to 10 m^3, has a regressive tariff structure, and whose effective tariff—at 4 m^3 of consumption—is very close to $1. The average price at 4 m^3 for utilities that impose a fixed-fee or minimum consumption charge is $0.64/$m^3$, as opposed to $0.47/$m^3$ for those that do not. These charges comprise 100 percent of the effective price at 10 m^3 in all utilities in Mozambique, Tanzania (DUWASA), and Malawi (CRWB).

The size of the first block can also impact the price paid by small consumers. Generally speaking, the larger the size of the first block in an IBT structure, the higher the probability that subsidies for the low price of the first block will leak to large consumers. Out of the 45 utilities in the sample, only nine have a tariff design with a first block that rises above 10 m^3 (the rest have a flat or linear structure). For instance, in Kaduna and Katsina in Nigeria, households pay $0.16/$m^3$ and $0.19/$m^3$ for up to 30 m^3 of consumption. This effect, though important, is overwhelmed by the fixed-fee and the minimum consumption charges that can erase the positive impact of the block tariff structure on small consumers.

Cross-subsidies between nonresidential and residential consumers

Cross-subsidization between residential and nonresidential consumers has been used to provide relief for poor consumers at the expense of nonresidential consumers. It is expected that these nonresidential consumers (which may be industrial, commercial, or governmental) should pay nearly the full price of water provision. In most countries, the utility revenue is primarily generated from industrial and commercial customers, though the number of customers is relatively lower than residential consumers. For instance, in Uganda, the nondomestic consumers contribute more than 60 percent of the NWSC's revenues while constituting less than 15 percent of the connection base (table 8).

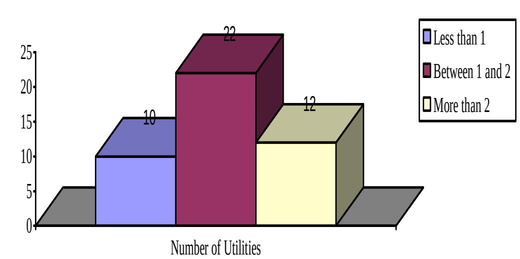
Table 8. Uganda: NWSC market structure

Consumer category	Share of connections (%)	Share of consumption (%)	Share of revenues (%)
Public standpipes	3.2	4.7	2.1
Domestic	82.8	47.9	36.7
Institution/government	3.4	25.5	29.2
Industrial/commercial	10.6	21.9	32

Source: Uganda Ministry of Water and Environment, 2006.

The effective tariffs of nonresidential consumers can be compared with high-end residential consumption at 100 m^3. The nonresidential consumers pay more than the residential consumers to all utilities except REGIDESO, KIWASCO, WASA, LWB, Windhoek, Electrogaz Tygerberg, eThekwani, and Johannesburg. In Mozambique, the commercial consumers pay about seven to eight times more than residential consumers for 100 m^3 of water. The implicit subsidy is most

Figure 13. Ratio of residential to commercial tariffs

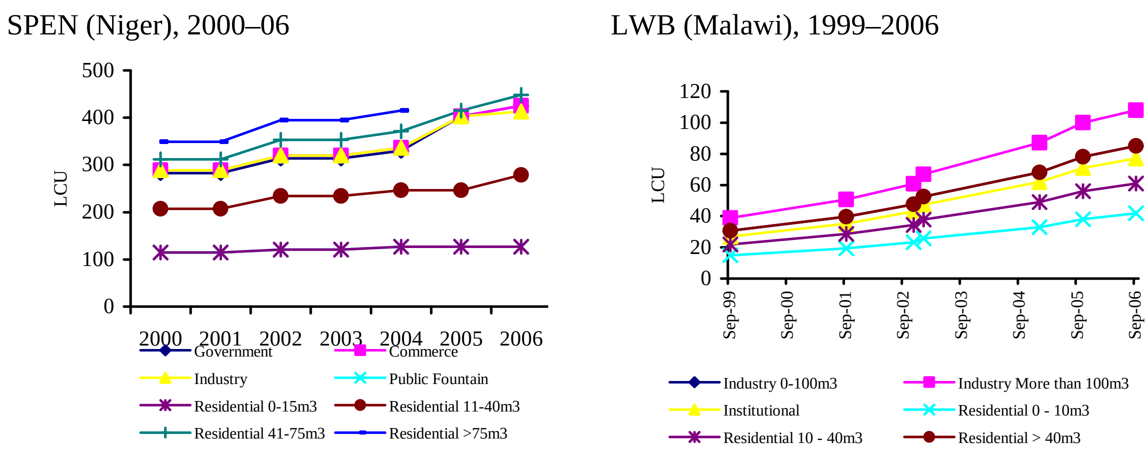


Source: AICD WSS Survey Database, 2007.

evident in Oshakati in Namibia, where the commercial consumers pay about 20 times more than the residential customers for 100 m^3 of water (figure 13).

Not only the levels, but the rate of increase in nonresidential tariffs is higher. For instance, in Niger, the standpost and low-volume tariffs have barely increased since 2000, but the industrial and commercial tariffs have registered a 6–7 percent growth in nominal terms (figure 14). While the Niger case is one of differential price increase, the LWB case is of equal price rise. The increase across all tariff bands has been equal in LWB in Malawi, though the increase at each level has been different. What emerges from this analysis is the discrepancy of prices among residential and nonresidential consumers. Infrastructure price inefficiencies create distortions in the development of the dynamic private sector as well.

Figure 14. Evolution of tariffs in Niger and Malawi

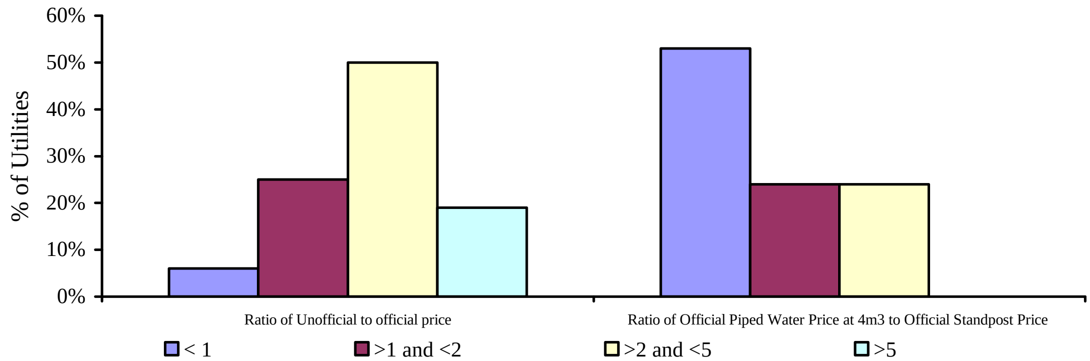


Source: AICD WSS Survey Database, 2007.

Cross-subsidies between public standposts and residential consumers

Utilities also supply water to standposts in addition to piped connections to houses and yards. In recent years, the standposts have emerged as an important source of water supply to households, particularly in the periurban areas in Africa. To reach this segment of the population, prices at the standposts are usually subsidized so that low-income households can benefit from improved water supply. The important policy question is whether the objective of providing affordable water to standpost users is realized. Evidence suggests that the retail price charged by standpost or kiosk operators can be several orders of magnitude higher than the formal price, defeating the purpose of providing cheap water. This price may also be higher than the prices paid by low-volume consumers of piped water. From the AICD WSS Survey 2007, it is possible to compare the formal and informal standpost price with the low-volume piped consumer price for 12 utilities. This highlights the extent of cross-subsidy that exists between the low-volume consumers at standposts and piped connections (figure 15).

Figure 15. Comparison of formal and informal standpost and small-volume piped consumer prices



Source: AICD WSS Survey Database, 2007.
Note: The DRC is not included in the graph because the formal standpost price is almost negligible.

The average price at standposts is $0.63/m^3. Windhoek and GWCL are the only utilities with a standpost charge of more than $1. At the other end are standpost consumers in Kinshasa, Addis Ababa, Antananarivo, and Lusaka, who pay less than $0.20/m^3 for water. Comparing the standpost consumers with low-volume piped consumers presents interesting results. In about half the utilities, the standpost consumers are paying more. For the rest, the evidence suggests that piped consumers are cross-subsidizing the standpost consumers at the same level of consumption. The consequence would be severely inequitable if the standpost and average piped consumers are in similar income strata.

The formal tariff may not, however, be what consumers really pay. Operators and middleman come between the utility and consumers. The result is a highly dynamic market where informal or retail prices are much higher than the formal or official standpost tariffs. Except in Ouagadougou in Burkina Faso, where the informal and formal prices are roughly similar, the informal prices are higher by several degrees of magnitude compared to the formal price. For half the utilities, the informal standpost price is between two and five times the formal standpost price. This is true of dense periurban areas with piped water shortage who have a significant dependence on the standposts. For instance, in Kinshasa in DRC, the informal standpost price is about $1, while the formal standpost price is almost negligible. Similar is the case in Antananarivo, Lusaka, and Cotonou, where the informal prices are more than five times higher than formal tariffs. In Accra, for instance, the informal and formal standpost prices are $5 and $3, respectively, while low-volume piped consumers pay $0.52/m^3 (annex I).

A few conclusions on the equity of tariff structures emerge from this analysis. First, the subsidy to the low block under the current IBT structure is not exclusively received by small consumers (usually the poor); instead, a large amount of the subsidy leaks to large consumers. Second, because of the fixed and minimum consumption charges and the large size of the low blocks, small consumers often end up paying higher effective prices per unit than large consumers. Third, the connection cost is high for many utilities compared to GNI per capita, indicating significant affordability problems for expanding networks into unserved areas. Fourth, the retail standpost price is higher than the utility-imposed price, resulting in high rent-seeking behavior on the part of operators. Fifth, the nonresidential tariffs are typically higher than household tariffs, suggesting cross-subsidization of residential consumers by high-volume industrial and commercial consumers.

6 A scorecard of tariff performance

A scorecard compiled on the basis of cost recovery, efficiency, and equity criteria suggests that many utilities are able to balance these goals, a majority of the utilities meet one of the conditions, and a few score low on all the conditions (table 9 and annex J). ELECTRA in Cape Verde has the most effective tariff structure and scores high on equity, efficiency, and cost recovery. The other outstanding performers are Oshakati, Windhoek, STEE, SONEB, and Katsina WB. These utilities impose the most efficient pricing mechanism, complemented by cost recovery and equity. STEE in Chad and AWSA in Ethiopia are implementing the most equitable tariff structure. ELECTRA, Oshakati, Windhoek, STEE, SONEB, and Katsina WB score the highest in efficiency. The cost-recovery conditions are met by four utilities—ELECTRA, Oshakati, Windhoek, and eThekwani—located in the MICs of Cape Verde, Namibia, and South Africa.

Table 9. Final scorecard for meeting tariff objectives: cost recovery, efficiency, equity

Criterion	Maximum score	Average (%)	Utilities scoring above average
Equity	4	51	ELECTRA, AWSA, NWASCO, SEEN, Katsina WB, FCT, Kaduna WB, Electrogaz, NWC South Darfur, SDE, STEE, DAEASCO, NWSC, Drakenstein, NWSC
Efficiency	3	45	SONEB, ONEA, ELECTRA, Dire Dawa, GWCL, KIWASCO, WASA, CRWB, Oshakati, Windhoek, Walvis Bay, Katsina WB, FCT, Electrogaz, Upper Nile, STEE, Johannesburg, Tygerberg
Cost recovery	2	22	SONEB, ONEA, SODESI, NWASCO, WASA, JIRAMA, BWB, Oshakati, Windhoek, SEEN, NWC Upper Nile, NWC Khartoum, SDE, DAEASCO, NWSCO, eThekwani, SWSC

One point is awarded for each of the following criteria:
[1] Cost recovery: O&M cost recovery
[2] Cost recovery: Capital cost recovery
[3] Efficiency: No fixed charge or minimum consumption charge
[4] Efficiency: Metering ratio is higher than sample average (77%)
[5] Efficiency: The price of the last block meets the capital cost
[6] Equity: Small piped consumers (at 4 m^3) pay less than average piped consumers (at 10 m^3)
[7] Equity: Standpost consumers pay less than small piped consumers (at 4 m^3)
[8] Equity: Connection cost as share of GNI per capita is lower than sample average (27%)
[9] Equity: Residential consumers pay less than nonresidential consumers at 100 m^3 of consumption

Source: AICD WSS Survey Database, 2007.

7 Conclusion

Cost recovery is a mandate for water and sanitation utilities in Africa, and African utilities perform well in recouping at least the cost of operations and maintenance (O&M) from their tariff structure. But only 36 percent of the utilities surveyed in this paper are meeting their full O&M cost (assuming an arbitrary threshold of \$0.4/m^3 for O&M cost recovery), and only 9 percent are meeting O&M costs plus a part of their capital costs.

African utilities operate in a high-cost environment, with an average O&M cost of \$0.6/m^3 and higher costs for utilities in MICs, such as South Africa and Namibia. These high costs, combined with the mandate to cover at least partial O&M costs, make tariffs higher in Africa than in other regions of the world.

The social and economic benefits of providing improved water to the poor are enormous, but providing those benefits takes its toll on utilities. The increasing block tariff (IBT) is the most common tariff structure in Africa. Most African utilities are able to achieve O&M cost recovery at the highest block tariffs, but not at the first-block tariffs, which are designed to provide affordable water to low-volume consumers, who are often poor.

Unfortunately, the equity objectives of the IBT structure are not met in many countries. The effective price paid by low-volume consumers often is actually *higher* than that paid by average or high-volume consumers. The subsidy to the lowest block under the current IBT structure is not received exclusively by the poor, because many consumers who are not poor do not exceed its upper limit. At the same time, the minimum consumption charge is often burdensome for the poorest customers.

Many poor households (in some countries, *most* poor households) are not even connected to the piped water network, so consumption subsidies do not reach them, except indirectly, through public standposts. In some countries, the cost of a household connection to the network exceeds GNI per capita. For utilities, whose business depends on connecting more customers to the network, the inability of the poor to pay connection costs can be a significant barrier to expansion. To create a more inclusive network and enable utilities to grow, many countries have begun to subsidize household connections.

In the rush to provide improved water to meet the targets of the Millennium Development Goals, standposts have emerged as an alternative to piped water. Managed by utilities, donors, or private operators, standposts are a good choice for many households. Those managed by utilities or that supply utility water are expected to use the formal utility tariffs. The average formal standpost tariff established by African utilities is about \$0.30/m^3. The price is kept low to make improved water available and affordable to low-income households. But the price actually charged for water withdrawn from public taps and then resold through informal channels can be several orders of magnitude higher (and much higher than the price paid by consumers of small volumes of piped water).

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Annex A Characteristics of water utilities and service providers

Utility	County	Recent reform	Water policy	Decentral-ization	Single supplier	Water and energy	Sanitation separately provided	PSP
SONEB	Benin	✓	×	×	✓	×	×	×
ONEA	Burkina Faso	✓	✓	✓	✓	×	×	×
ELECTRA	Cape Verde	✓	×	✓	×	✓	×	✓
STEE	Chad	×	×	×	✓	✓	×	×
REGIDESO	DRC	×	×	×	✓	×	✓	✓
SODESI	Cote d'Ivoire	✓	✓	×	✓	×	✓	✓
AWSA	Ethiopia, Addis Ababa	✓	✓	✓	×	×	×	×
ADAMA	Ethiopia	✓	✓	✓	×	×	×	×
Dire Dawa	Ethiopia, Dire Dawa	✓	✓	✓	×	×	×	×
GWCL	Ghana	✓	✓	×	✓	×	✓	✓
NWASCO	Kenya, Nairobi	✓	✓	✓	×	×	×	✓
KIWASCO	Kenya, Kisumu	✓	✓	✓	×	×	×	✓
WASA	Lesotho	✓	✓	✓	✓	×	×	×
AdeM Beira	Mozambique, Beira	✓	✓	✓	×	×	✓	✓
AdeM Maputo	Mozambique, Maputo	✓	✓	✓	×	×	✓	✓
AdeM Nampula	Mozambique, Nampula	✓	✓	✓	×	×	✓	✓
AdeM Pemba	Mozambique, Pemba	✓	✓	✓	×	×	✓	✓
AdeM Quelimane	Mozambique, Quelimane	✓	✓	✓	×	×	✓	✓
JIRAMA	Madagascar	✓	✓	✓	✓	✓	✓	✓
LWB	Malawi, Lilongwe	✓	✓	×	×	×	✓	×
BWB	Malawi, Blantyre	✓	✓	×	×	×	✓	×
CRWB	Malawi, Central Region	✓	✓	×	×	×	✓	×
Walvis Bay	Namibia, Walvis Bay	✓	✓	✓	×	×	×	×
Windhoek	Namibia, Windhoek	✓	✓	✓	×	×	×	×
Oshakati	Namibia, Oshakati	✓	✓	✓	×	×	×	×
SEEN	Niger	✓	✓	✓	✓	×	✓	✓
FCT WB	Nigeria, FCT	×	✓	×	×	×	✓	✓
Kaduna WB	Nigeria, Kaduna	×	✓	×	×	×	✓	✓
Katsina WB	Nigeria, Katsina	×	✓	×	×	×	✓	✓
Electrogaz	Rwanda	×	✓	×	✓	✓	✓	✓
NWC Khartoum	Sudan, Khartoum	✓	×	✓	×	×	✓	✓

Utility	County	Recent reform	Water policy	Decentral-ization	Single supplier	Water and energy	Sanitation separately provided	PSP
NWC South Darfur	Sudan, South Darfur	✓	✕	✓	✕	✕	✓	✓
NWC Upper Nile	Sudan, Upper Nile	✓	✕	✓	✕	✕	✓	✓
SDE	Senegal	✓	✓	✕	✓	✕	✓	✓
DAWASCO	Tanzania, Dar es Salaam	✓	✓	✓	✕	✕	✓	✓
DUWASA	Tanzania, Dodoma	✓	✓	✓	✕	✕	✓	✓
MWSA	Tanzania, Mwanza	✓	✓	✓	✕	✕	✓	✓
NWSC	Uganda	✓	✓	✓	✕	✕	✕	✓
Drakenstein	South Africa, Drakenstein	✓	✓	✓	✕	✕	✕	✓
Tygerberg	South Africa, Tygerberg	✓	✓	✓	✕	✕	✕	✓
eThekwini	South Africa, eThekwini	✓	✓	✓	✕	✕	✕	✓
Johannesburg	South Africa, Johannesburg	✓	✓	✓	✕	✕	✕	✓
SWSC	Zambia, Southern	✓	✓	✓	✕	✕	✕	✕
LWSC	Zambia, Lusaka	✓	✓	✓	✕	✕	✕	✕
NWSC	Zambia, Nkana	✓	✓	✓	✕	✕	✕	✕
Count of "✓"		**40**	**40**	**32**	**9**	**4**	**24**	**30**

Source: AICD WSS Survey Database, 2007.

Annex B Categories of water tariff structure in African utilities

Category	Utilities	Count
Minimum consumption + IBT	SODESI, BWB, AdeM Beira, AdeM Pemba, AdeM Nampula, AdeM Quilimane, AdeM Maputo	7
Fixed charge + IBT	ONEA, JIRAMA, WASA, LWB, Windhoek, Oshakati, DUWASA, MWSA, Drakenstein, Tygerrberg, eThekwani, LWSC	12
IBT	SONEB, STEE, REGIDESO, SDE, AWSA, ADAMA, Dire Dawa, GWCL, NWASCO, Walvis Bay, SEEN, Kaduna WB, Katsina WB, ELECTROGAZ, NWC Khartoum, DAWASCO, Johannesburg, NWSC, ELECTRA, SWSC	20
Fixed charge + linear	NWSC	1
Fixed charge	CRWB	1
Linear	FCT, NWC South Darfur, NWC Upper Nile	3
U-shaped	KIWASCO	1

Source: AICD WSS Survey Database, 2007.

Annex C Tariffs by level of water consumption

Utility	4m3	5m3	6m3	8m3	10m3	15m3	20m3	25m3	30m3	40m3	50m3	100m3
SONEB	0.41	0.41	0.48	0.57	0.63	0.70	0.74	0.76	0.78	0.79	0.81	0.83
ONEA	0.90	0.80	0.73	0.75	0.76	0.77	0.78	0.79	0.79	1.12	1.33	1.73
SODESI	0.04	0.03	0.03	0.02	0.06	0.20	0.30	0.39	0.45	0.53	0.57	0.71
ELECTRA	2.67	2.67	2.67	2.93	3.09	3.62	3.88	4.04	4.14	4.27	4.35	4.51
REGIDESO	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.04
AWSA	0.19	0.19	0.19	0.21	0.24	0.28	0.30	0.32	0.34	0.36	0.37	0.40
ADAMA	0.26	0.26	0.27	0.28	0.29	0.33	0.35	0.37	0.38	0.39	0.40	0.42
Dire Dawa	0.14	0.14	0.15	0.17	0.17	0.19	0.19	0.21	0.22	0.24	0.24	0.29
GWCL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.56	0.59	0.63	0.65	0.69
NWASCO	0.18	0.18	0.18	0.18	0.18	0.21	0.23	0.24	0.24	0.29	0.31	0.40
KIWASCO	0.60	0.60	0.60	0.60	0.60	0.52	0.48	0.47	0.46	0.45	0.47	0.52
WASA	0.40	0.37	0.39	0.41	0.43	0.57	0.64	0.71	0.79	0.88	0.94	1.06
JIRAMA	0.11	0.09	0.08	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08
ADeM Beira	0.96	0.77	0.64	0.48	0.38	0.42	0.44	0.47	0.48	0.53	0.55	0.61
Adem Maputo	0.96	0.77	0.64	0.48	0.38	0.48	0.53	0.56	0.58	0.62	0.64	0.67
AdeM Nampula	0.96	0.77	0.64	0.48	0.38	0.41	0.42	0.44	0.45	0.48	0.50	0.54
AdeM Pemba	0.96	0.77	0.64	0.48	0.38	0.40	0.40	0.42	0.43	0.46	0.49	0.53
AdeM Quelimane	0.96	0.77	0.64	0.48	0.38	0.40	0.40	0.41	0.42	0.46	0.48	0.53
LWB	0.91	0.79	0.71	0.61	0.54	0.51	0.49	0.48	0.48	0.51	0.53	0.57
BWB	0.12	0.10	0.16	0.24	0.29	0.36	0.40	0.42	0.43	0.45	0.47	0.49
CRWB	0.58	0.47	0.39	0.29	0.23	0.16	0.12	0.09	0.08			
Walvis Bay	0.71	0.71	0.71	0.71	0.71	0.71	0.83	0.90	1.06	1.26	1.38	1.87
Windhoek	1.45	1.32	1.23	1.26	1.27	1.29	1.30	1.31	1.31	1.32	1.43	1.94
Oshakati	1.97	1.78	1.65	1.53	1.46	1.36	1.41	1.44	1.46	1.48	1.57	1.76
SEEN	0.52	0.47	0.43	0.39	0.36	0.43	0.47	0.49	0.50	0.52	0.60	0.76
FCT WB	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Kaduna	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.18
Katsina WB	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.21	0.22
Electrogaz	0.44	0.44	0.46	0.48	0.50	0.51	0.52	0.56	0.59	0.63	0.65	0.92
NWC Khartoum	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.52
NWC South Darfur	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
NWC Upper Nile	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
SDE	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.54	0.65	0.78	0.92	1.19
STEE	0.22	0.22	0.22	0.22	0.22	0.22	0.28	0.32	0.34	0.38	0.39	0.43
DAEASCO	0.39	0.39	0.41	0.43	0.45	0.47	0.48	0.49	0.50	0.50	0.50	0.51
DUWASA	0.99	0.79	0.66	0.49	0.40	0.40	0.40	0.40	0.42	0.44	0.45	0.48
MWSA	0.51	0.46	0.42	0.38	0.35	0.31	0.29	0.28	0.28	0.27	0.27	0.26
NWSC	0.88	0.83	0.80	0.77	0.74	0.71	0.70	0.69	0.68	0.67	0.67	0.66
Drakenstein	0.00	0.00	0.00	0.25	0.25	0.34	0.38	0.41	0.42	0.51	0.57	0.85
Tygerberg	0.00	0.00	0.00	0.34	0.35	0.43	0.52	0.64	0.72	0.83	0.94	1.40
eThekwini	0.00	0.00	0.00	1.08	1.04	0.99	0.96	0.95	0.94	1.14	1.27	1.52
Johannesburg	0.00	0.00	0.00	0.15	0.24	0.42	0.56	0.69	0.77	0.87	0.98	1.61
SWSC	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.41
LWSC	0.56	0.50	0.45	0.42	0.39	0.36	0.34	0.34	0.33	0.34	0.35	0.36
NWSC	0.25	0.25	0.25	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.30	0.34

Annex D Water tariffs in African utilities

Country	Utility	Fixed charge	Fixed charge as % of $10m^3$	Number of blocks	Size of 1st block	Size of nth block	Price of 1st block	Price of nth block
BEN	SONEB	0.00	0	2	5	5+	0.41	0.85
BFA	ONEA	2.05	27	3	6	30+	0.39	2.13
CIV	SODESI	0.00	0	3	8	300+	0.00	1.20
CPV	ELECTRA	0.00	0	2	6	11+	2.67	4.67
DRC	REGIDESO	0.00	0	4	10	40+	0.05	0.12
ETH	AWSA	0.16	7	5	7	20+	0.19	0.42
ETH	ADAMA	0.00	0	3	5	30+	0.26	0.44
ETH	Dire Dawa	0.00	0	4	5	50+	0.14	0.34
GHA	GWCL	0.00	0	4	20	20+	0.52	0.73
KEN	NWASCO	0.00	0	2	10	60+	0.18	0.52
KEN	KIWASCO	0.00	0	4	10	60+	0.60	0.60
LSO	WASA	0.00	0	5	5	24+	0.29	1.18
MDG	JIRAMA	0.43	68	4	10	10+	0.03	0.08
MOZ	ADeM Beira	3.83	100	3	9	30+	0.00	0.66
MOZ	Adem Maputo	3.83	100	3	9	30+	0.00	0.71
MOZ	AdeM Nampula	3.83	100	3	9	30+	0.00	0.58
MOZ	AdeM Pemba	3.83	100	3	9	30+	0.00	0.57
MOZ	AdeM Quelimane	3.83	100	3	9	30+	0.00	0.57
MWI	LWB	0.30	5	2	10	30+	0.30	0.61
MWI	BWB	2.42	83	1	4	40+	0.00	0.52
MWI	CWB	0.48	20	3	nav	nav	0.00	0.00
NAM	Walvis Bay	2.33	33	0	15	85+	0.71	3.48
NAM	Windhoek	0.00	0	4	6	45+	0.80	2.46
NAM	Oshakati	2.58	18	3	6	40+	1.01	1.94
NER	SEEN	3.85	106	4	10	40+	0.26	0.92
NGA	FCT WB	1.02	26	3	nav	nav	0.39	0.39
NGA	Kaduna WB	0.00	0	1	30	30+	0.16	0.19
NGA	Katsina WB	0.00	0	2	30	1000+	0.19	0.28
RWA	Electrogaz	0.00	0	3	5	500+	0.44	1.09
SDN	NWC Khartoum	0.00	0	6	20	60+	0.37	0.73
SDN	NWC South Darfur	0.00	0	4	nav	nav	0.64	0.64
SDN	NWC Upper Nile	0.00	0	1	nav	nav	0.59	0.59
SEN	SDE	0.00	0	1	20	40+	0.37	1.46
TCD	STEE	0.00	0	3	15	15+	0.22	0.47
TZA	DAEASCO	0.00	0	2	5	5+	0.39	0.52
TZA	DUWASA	3.95	100	3	14	25+	0.00	0.51
TZA	MWSA	1.11	32	3	24	75+	0.24	0.28
UGA	NWSC	0.92	12	1	nav	nav	0.65	0.65
ZAF	Drakenstein	1.52	60	7	6	1000+	0.00	1.86
ZAF	Tygerberg	2.02	58	6	6	50+	0.00	1.86
ZAF	eThekwini	6.89	66	3	6	30+	0.00	1.77

Country	Utility	Fixed charge	Fixed charge as % of 10m^3	Number of blocks	Size of 1st block	Size of nth block	Price of 1st block	Price of nth block
ZAF	Johannesburg	0.00	0	6	6	40+	0.00	1.40
ZMB	SWSC	0.00	0	4	10	50+	0.30	0.47
ZMB	LWSC	1.24	32	5	6	170+	0.25	0.55
ZMB	NWSC	0.00	0	4	6	50+	0.25	0.37
MIC average			26	4.00	6.89		0.61	2.29
LIC average			28	3.03	11.29		0.24	0.61

Source: AICD WSS Survey Database, 2007.

MIC = middle-income countries; LIC = low-income countries.

Annex E Structure and levels of nonresidential tariffs

			Industrial			Commercial			Government/public institutions		
Country	Utility	Connection charge	Fixed charge	Number of blocks	Price of 1st block	Fixed charge	Number of blocks	Price of 1st block	Fixed charge	Number of blocks	Price of 1st block
BEN	SONEB		n	1	0.85	n	1	0.85	n	1	0.85
BFA	ONEA		y	1	2.13	y	1	2.13	y	1	2.13
CIV	SODESI		y	4	0.48		4	0.48	n	1	1.07
CPV	ELECTRA		n	1	0.78	n	1	0.78	n	1	
DRC2	REGIDESO		n	1		n	3	0.01	n	1	0.00
ETH1	AWSA		n	1	0.42	n	1	0.42	n	1	0.42
ETH2	ADAMA		—	—	—	—	—	—	—	—	—
ETH3	Dire Dawa		—	—	—	—	—	—	—	—	—
GHA1b	GWCL		n	—	—	—	—	2.20	y	—	—
KEN1	NWASCO			—	—	—	4	0.18	—	—	—
KEN2	KIWASCO	y	—	—	—	—	5	0.60	—	—	—
LSO	WASA	y	y	1	0.69	y	1	0.69	y	1	0.69
MDG	JIRAMA								n	2	0.23
MOZ1	ADeM Beira		n	2	15.69	n	2	15.69	n	2	15.69
MOZ2	Adem Maputo		n	2	16.75	n	2	16.75	n	2	16.75
MOZ3	AdeM Nampula		n	2	13.88	n	2	13.88	n	2	13.88
MOZ4	AdeM Pemba		n	2	15.02	n	2	15.02	n	2	15.02
MOZ5	AdeM Quilimane		n	2	15.22	n	2	15.22	n	2	15.22
MWI1	LWB		y	2	0.49	y	2	0.49	y	2	0.45
MWI2	BWB		—	—	—	—	—	—	—	—	—
MWI3	CRWB		—	—	—	—	—	—	—	—	—
NAM1	Walvis Bay		n	4	1.99	n	4	1.99	n	4	1.99
NAM2	Windhoek	y	n	1	1.63	n	1	1.63	n	1	1.63
NA M3	Oshakati	y	y	3	17.70	y	3	17.70	y	3	17.70
NER	SEEN		n	3	0.85	n	1	0.87	n	1	0.87
NGA1b	FCT WB		n	1	7.84	n	1	0.78	n	2	0.47
NGA3	Kaduna WB		n	3	0.55	n	2	0.55	n	2	0.19
NGA5	Katsina WB		n	1	1.57	n	1	1.57	n	2	0.20
RWA	Electrogaz		n	3	0.44	n	3	0.44	n	3	0.44
SDN1a	NWC Khartoum		n	1	0.73	n	1	0.73	n	1	0.73
SDN2	NWC South Darfur		n	1	1.41	n	1	1.41	n	1	1.41
SDN3	NWC Upper Nile		n	1	1.35	n	1	1.35	n	1	1.35
SEN2	SDE		—	—	—	—	—	1.62	n	—	1.62
TCD	STEE		n	2	0.22	n	2	0.22	n	2	0.22
TZA1	DAWASCO		n	3	0.57	n	3	0.57	n	3	0.57
TZA2	DUWASA		n	1	13.04	n	1	13.04	n	1	13.04

			Industrial			**Commercial**			**Government/public institutions**		
Country	Utility	Connection charge	Fixed charge	Number of blocks	Price of 1st block	Fixed charge	Number of blocks	Price of 1st block	Fixed charge	Number of blocks	Price of 1st block
TZA3	MWSA		n	1	0.47	n	1	0.40	n	1	0.28
UGA	NWSC		n	1	1.05	n	1	1.05	n	3	0.80
ZAF1	Drakenstein		—	—	—	—	—	—	—	—	—
ZAF2	Tygerberg		y	1	0.82	y	1	0.82	y	1	0.82
ZAF3	eThekwini		y	1	0.88	y	1	0.88	y	1	0.88
ZAF4	Johannesburg		—	—	—	—	—	—	—	—	—
ZMB1	SWSC		—	—	—	—	—	—	—	—	—
ZMB2	LWSC		y				3	0.37			

Source: AICD WSS Survey Database, 2007.
— = data not available.

Annex F Structure of wastewater tariffs

Country	Utility	Wastewater responsibility	Connection cost	Tariff part of water bill	% of water bill	Fixed fee	Block tariff
BEN	SONEB	n	—	—	—	—	
BFA	ONEA	—	—	—	—	—	y
CPV	ELECTRA	—	—	—	—	—	—
TCD	STEE	n	—	—	—	—	—
DRC	REGIDESO	n	—	—	—	—	—
CIV	SODESI	—	y	—	—	—	—
ETH	AWSA	—	—	—	—	—	y
ETH	ADAMA	n	—	—	—	—	—
ETH	Dire Dawa	n	—	—	—	—	—
GHA	GWCL	n	—	—	—	—	—
KEN	NWASCO	—	—	—	—	—	y
KEN	KIWASCO	—	—	—	—	—	—
LSO	WASA	—	—	—	85	—	—
MOZ	ADeM Beira	n	—	—	—	—	—
MOZ	Adem Maputo	n	—	—	—	—	—
MOZ	AdeM Nampula	n	—	—	—	—	—
MOZ	AdeM Pemba	n	—	—	—	—	—
MOZ	AdeM Quelimane	n	—	—	—	—	—
MDG	JIRAMA	—	—	—	—	—	—
MWI	LWB	n	—	—	—	—	—
MWI	BWB	n	—	—	—	—	—
MWI	CRWB	n	—	—	—	—	—
NAM	Walvis Bay	—	—	—	—	y	y
NAM	Windhoek	—	—	—	—	—	—
NAM	Oshakati	—	y	—	—	y	
NER	SEEN	n	—	—	—	—	—
NGA	FCT WB	—	—	—	—	—	—
NGA	Kaduna WB	n	—	—	—	—	—
NGA	Katsina WB	n	—	—	—	—	—
RWA	Electrogaz	n	—	—	—	—	—
SDN	NWC Khartoum	—	—	—	—	—	—
SDN	NWC South Darfur	—	—	—	—	—	—
SDN	NWC Upper Nile	—	—	—	—	—	—
SEN	ONAS	—	—	—	—	—	y
TZA	DAWASCO	—	—	y	80	—	—
TZA	DUWASA	—	y	y	40	—	—
TZA	MWSA	—	y	y	50	—	—
UGA	NWSC	—	y	y	75	—	—
ZAF	Drakenstein	—	—	—	—	—	—
ZAF	Tygerberg	—	—	—	—	—	—
ZAF	eThekwini	—	—	—	—	—	—
ZAF	Johannesburg	—	—	—	—	—	—

Country	Utility	Wastewater responsibility	Connection cost	Tariff part of water bill	% of water bill	Fixed fee	Block tariff
ZMB	KWSC	—	—	y	30	—	—
ZMB	LWSC	—	y	y	30	—	—
ZMB	NWSC	—		y	30	—	—
		Count= 18	Count= 8	Count=8	Average=53%		Count=6

Source: AICD WSS Survey Database, 2007.

— = data not available.

Annex G O&M cost per unit of consumption

Utility	2001	2002	2003	2004	2005	Average 2001–05
SONEB	—	—	—	0.66	0.70	0.68
ONEA	0.49	0.51	0.69	0.74	0.75	0.64
SODESI	—	—	—	—	—	—
ELECTRA	—	—	—	—	—	—
REGIDESO	—	—	—	—	—	—
AWSA	0.43	0.51	0.52	0.63	0.63	0.54
ADAMA	2.52	0.73	0.77	1.05	0.70	1.15
Dire Dawa	—	—	0.16	0.18	0.32	0.22
GWCL	0.22	0.20	0.25	0.21	0.32	0.24
NWASCO	—	—	—	0.21	0.18	0.19
KIWASCO	—	—	—	—	—	—
WASA	—	—	—	1.05	1.13	1.09
JIRAMA	—	—	0.20	0.25	0.49	0.31
ADeM Beira	—	—	—	0.26	0.16	0.21
Adem Maputo	—	—	0.50	0.62	0.70	0.61
AdeM Nampula	—	—	—	—	—	—.
AdeM Pemba	0.16	0.40	0.62	0.48	0.57	0.45
AdeM Quelimane	0.41	0.39	0.45	0.41	0.41	0.41
LWB	—	—	0.19	0.14	0.23	0.19
BWB	—	0.31	0.32	0.41	0.51	0.39
CRWB	—	0.48	0.73	0.58	0.73	0.63
Walvis Bay	—	0.22	0.26	0.36	0.35	0.30
Windhoek	—	0.69	0.32	0.36	0.53	0.47
Oshakati	—	0.50	0.26	0.38	0.42	0.39
SEEN	0.82	0.71	1.49	1.46	1.44	1.18
FCT WB	—	—	—	—	—	—
Kaduna WB	0.90	0.79	1.07	1.45	2.08	1.26
Katsina WB	0.17	0.36	0.47	0.43	0.46	0.38
Electrogaz	—	—	—	—	—	—
NWC Khartoum	—	—	—	—	—	—
NWC South Darfur	—	—	—	—	—	—
NWC Upper Nile	—	0.11	0.14	0.29	0.06	0.15
SDE	—	0.19	0.24	0.25	0.26	0.23
STEE	—	—	0.18	0.20	—	0.19
DAEASCO	—	0.18	0.19	0.34	0.51	0.31
DUWASA	—	—	—	—	—	—
MWSA	0.65	0.64	0.80	0.85	0.85	0.76
NWSC	0.46	0.44	0.83	0.98	1.21	0.78
Drakenstein	—	—	0.45	0.60	0.70	0.58
Tygerberg	—	—	1.09	1.32	1.56	1.32
eThekwini	0.91	0.94	1.24	1.35	1.50	1.19
Johannesburg	—	—	—	—	0.28	0.28

Utility	2001	2002	2003	2004	2005	Average 2001–05
SWSC	—	—	—	—	0.49	0.49
LWSC	—	—	—	—	0.73	0.73
NWSC	—	—	—	—	—	—
Average	**0.61**	**0.44**	**0.49**	**0.55**	**0.61**	
MIC	**0.78**	**0.72**	**0.95**	**1.11**	**1.31**	
LIC	**0.55**	**0.39**	**0.37**	**0.42**	**0.46**	

Source: AICD WSS Survey Database, 2007.

MIC = middle-income countries; LIC = low-income countries.

Annex H Cost recovery of African utilities

Utility	Effective price at 4m³	Cost recovery			Effective price at 10m³	Cost recovery			Effective price at 40m³	Cost recovery		
		O&M (GWI)	Actual O & M cost (AICD)	Capital cost (GWI)		O&M (GWI)	Actual O&M cost (AICD)	Capital cost (GWI)		O&M (GWI)	Actual O&M cost (AICD)	Capital cost (GWI)
SONEB	0.41	y	n	n	0.63	y	n	n	0.79	y	y	n
ONEA	0.90	y	y	n	0.76	y	y	n	1.12	y	y	y
SODESI	0.04	n	n	n	0.06	n	n	n	0.53	y	n	n
ELECTRA	2.67	y	—	y	3.09	y	—	y	4.27	y	—	y
REGIDESO	0.05	n	N	n	0.05	n	N	n	0.07	n	n	n
AWSA	0.19	n	N	n	0.24	n	N	n	0.36	n	y	n
ADAMA	0.26	n	N	n	0.29	n	N	n	0.39	n	y	n
Dire Dawa	0.14	n	N	n	0.17	n	N	n	0.24	n	y	n
GWCL	0.52	y	—	n	0.52	y	—	n	0.63	y	—	n
NWASCO	0.18	n	n	n	0.18	n	n	n	0.29	n	n	n
KIWASCO	0.60	y	y	n	0.60	y	y	n	0.45	y	n	n
WASA	0.40	n	y	n	0.43	y	y	n	0.88	y	y	y
JIRAMA	0.11	n	n	n	0.06	n	n	n	0.08	n	n	n
ADeM Beira	0.96	y	n	n	0.38	n	n	n	0.53	y	Y	n
Adem Maputo	0.96	y	n	n	0.38	n	n	n	0.62	y	n	n
AdeM Nampula	0.96	y	y	n	0.38	n	y	n	0.48	y	y	n
AdeM Pemba	0.96	y	n	n	0.38	n	n	n	0.46	y	n	n
AdeM Quelimane	0.96	y	n	n	0.38	n	n	n	0.46	y	y	n
LWB	0.91	y	n	n	0.54	y	n	n	0.51	y	n	n
BWB	0.12	n	n	n	0.29	n	n	n	0.45	y	y	n
CRWB	0.58	y	y	n	0.23	n	y	n	0.00	n	n	n
Walvis Bay	0.71	y	—	n	0.71	y	—	n	1.26	y	—	y
Windhoek	1.45	y	n	y	1.27	y	n	y	1.32	y	n	y
Oshakati	1.97	y	y	y	1.46	y	y	y	1.48	y	y	y
SEEN	0.52	y	n	n	0.36	n	n	n	0.52	y	y	n
FCT WB	0.39	n	—	n	0.39	n	—	n	0.39	n	—	n
Kaduna WB	0.16	n	—	n	0.16	n	—	n	0.17	n	—	n
Katsina WB	0.19	n	y	n	0.19	n	y	n	0.20	n	y	n
Electrogaz	0.44	y	n	n	0.50	y	n	n	0.63	y	y	n
NWC Khartoum	0.37	n	y	n	0.37	n	y	n	0.37	n	y	n
NWC South Darfur	0.64	y	y	n	0.64	y	y	n	0.64	y	y	n
NWC Upper Nile	0.59	y	n	n	0.59	y	n	n	0.59	y	n	n
SDE	0.37	n	n	n	0.37	n	n	n	0.78	y	n	n
STEE	0.22	n	—	n	0.22	n	—	n	0.38	n	—	n
DAEASCO	0.39	n	—	n	0.45	y	—	n	0.50	y	—	n
DUWASA	0.99	y	n	n	0.40	n	n	n	0.44	y	y	n
MWSA	0.51	y	y	n	0.35	n	y	n	0.27	n	y	n
NWSC	0.88	y	y	n	0.74	y	y	n	0.67	y	y	n
Drakenstein	0.00	n	n	n	0.25	n	n	n	0.51	y	n	n

Utility	Effective price at $4m^3$	Cost recovery O&M (GWI)	Cost recovery Actual O & M cost (AICD)	Cost recovery Capital cost (GWI)	Effective price at $10m^3$	Cost recovery O&M (GWI)	Cost recovery Actual O&M cost (AICD)	Cost recovery Capital cost (GWI)	Effective price at $40m^3$	Cost recovery O&M (GWI)	Cost recovery Actual O&M cost (AICD)	Cost recovery Capital cost (GWI)
Tygerberg	0.00	n	n	n	0.35	n	n	n	0.83	y	n	y
eThekwini	0.00	n	n	y	1.04	y	n	y	1.14	y	n	y
Johannesburg	0.00	n	n	n	0.24	n	n	n	0.87	y	n	y
SWSC	0.30	n	n	n	0.30	n	n	n	0.34	n	y	n
LWSC	0.56	y	y	n	0.39	n	y	n	0.34	n	y	n
NWSC	0.25	n	y	n	0.26	n	y	n	0.29	n	y	n
Cost Recovery (%)		23	13	4		16	13	4		29	22	9
Average	0.55				0.49				0.63			
MIC	0.72				0.89				1.31			
LIC	0.50				0.38				0.44			

Source: AICD WSS Survey Database, 2007.

Annex I Structure of tariffs for standposts and public fountains

Utility	Official standpost price (US$/m^3)	Unofficial standpost price (USD/m^3)	Official price at 4m^3	Ratio of unofficial to official price	Ratio of official piped water price at 4m^3 to official standpost price
SONEB	0.41	1.91	0.41	4.66	0.99
ONEA	0.51	0.48	0.90	0.94	1.76
SODESI	0.45	0.93	0.04	2.06	0.09
ELECTRA	—	9.44	2.67	—	—
REGIDESO	0.05	1.02	0.05	20.40	0.93
AWSA	0.19	0.87	0.19	4.55	1.02
ADAMA	—	—	0.26	—	—
Dire Dawa	—	—	0.14	—	—
GWCL	3.64	5.51	0.52	1.52	0.14
NWASCO	n.a	1.73	0.18	—	—
KIWASCO	Nav	—	0.60	—	—
WASA	n.a	2.58	0.40	—	—
JIRAMA	0.14	1.24	0.11	8.60	0.75
ADeM Beira			0.96		
Adem Maputo	0.31	0.98	0.96	3.17	3.09
AdeM Nampula	—	—	0.96	—	—
AdeM Pemba	—	—	0.96	—	—
AdeM Quelimane	—	—	0.96	—	—
LWB	—	—	0.91	—	—
BWB	0.29	1.16	0.12	4.00	0.41
CRWB	—	—	0.58	—	—
Walvis Bay	—	—	0.71	—	—
Windhoek	1.41	n.a	1.45	n.a	1.02
Oshakati	—	—	1.97	—	—
SEEN	0.24	0.48	0.52	1.97	2.13
FCT WB	—	—	0.39	—	—
Kaduna WB	n.a	n.a	0.16	n.a	n.a
Katsina WB	—	—	0.19	—	—
Electrogaz	0.44	1.79	0.44	4.07	1.00
NWC Khartoum	0.92	1.15	0.37	1.25	0.40
NWC South Darfur	—	—	0.64	—	—
NWC Upper Nile	—	—	0.59	—	—
SDE	0.54	1.53	0.37	2.83	0.69
STEE	n.a	n.a	0.22	n.a	n.a
DAEASCO	0.58	0.87	0.39	1.51	0.67
DUWASA	—	—	0.99	—	—
MWSA	—	—	0.51	—	—
NWSC	0.39	1.40	0.88	3.63	2.28

Utility	Official standpost price (US$/m^3)	Unofficial standpost price (USD/m^3)	Official price at 4m^3	Ratio of unofficial to official price	Ratio of official piped water price at 4m^3 to official standpost price
Drakenstein	—	—	0.00	—	—
Tygerberg	—	—	0.00	—	—
eThekwini	—	—	0.00	—	—
Johannesburg	—	—	0.00	—	—
SWSC	—	—	0.30	—	—
LWSC	0.19	1.67	0.56	9.03	3.02
NWSC	—	—	0.25	—	—

Source: AICD WSS Survey Database, 2007.

Annex J Scorecard on cost recovery, efficiency, and equity in tariff structure

	Cost recovery		**Efficiency**			**Equity**				**Total score**			
Utility	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	Equity score	Efficiency score	Cost-recovery score	Total score
SONEB	1	0	1	1	1	1	0	0	1	2	3	1	6
ONEA	1	0	0	1	1	0	1	0	1	2	2	1	5
SODESI	0	0	0	0	0	1	0	1	—	2	0	0	2
ELECTRA	1	1	1	1	1	1	1	—	1	3	3	2	8
REGIDESO	0	0	1	0	0	1	0	—	0	1	1	0	2
AWSA	0	0	1	0	0	1	1	1	1	4	1	0	5
Dire Dawa	0	0	1	1	0	1	—	0	—	1	2	0	3
ADAMA	0	0	1	0	0	1	—	1	—	2	1	0	3
GWCL	1	0	1	1	0	1	0	—	1	2	2	1	5
NWASCO	0	0	1	0	0	1	1		1	3	1	0	4
KIWASCO	1	0	1	0	1	1		1	0	2	2	1	5
WASA	1	0	1	1	0	1	1	0	0	2	2	1	5
JIRAMA	0	0	0	0	0	0	0			0	0	0	0
AdeM Pemba	0	0	0	1	0	0	—	0	1	1	1	0	2
AdeM Quelimane	0	0	0	1	0	0	1	0	1	2	1	0	3
ADeM Beira	0	0	0	0	0	0	—	0	1	1	0	0	1
Adem Maputo	0	0	0	0	0	0	—	0	1	1	0	0	1
AdeM Nampula	0	0	0	0	0	0	—	0	1	1	0	0	1
BWB	0	0	0	1	0	1	—	—	—	1	1	0	2
CRWB	0	0	0	1	1	0	0	—	—	0	2	0	2
LWB	1	0	0	1	0	0	—	—	0	0	1	1	2
Oshakati	1	1	1	1	1	0	—	—	1	1	3	2	6
Windhoek	1	1	1	1	1	0	1	—	0	1	3	2	6
Walvis Bay	1	0	0	1	1	1	—	1		2	2	1	5
SEEN	0	0	0	0	0	0	1	1	1	3	0	0	3
Katsina WB	0	0	1	1	1	1	—	1	1	3	3	0	6
FCT WB	0	0	1	1	0	1	1	0	1	3	2	0	5
Kaduna WB	0	0	1	0	0	1	—	1	1	3	1	0	4
Electrogaz	1	0	1	1	0	1	1	1	0	3	2	1	6
NWC Upper Nile	1	0	1	0	1	1	0	0	1	2	2	1	5
NWC Khartoum	0	0	1	0	0	1	—	0	1	2	1	0	3
NWC South Darfur	1	0	1	0	0	1	—	1	1	3	1	1	5
SDE	0	0	1	0	0	1	0	1	1	3	1	0	4
STEE	0	0	1	1	1	1	1	1	1	4	3	0	7
DAEASCO	1	0	1	0	0	1	0	1	1	3	1	1	5

	Cost recovery		**Efficiency**			**Equity**				**Total score**			
Utility	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	Equity score	Efficiency score	Cost-recovery score	Total score
DUWASA	0	0	0	0	0	0	—	1	1	2	0	0	2
MWSA	0	0	0	0	0	0	—	1		1	0	0	1
NWSC	1	0	0	1	0	0	1	1	1	3	1	1	5
eThekwini	1	1	0	0	1	1	—	1	0	2	1	2	5
Johannesburg	0	0	1	1	1	1	—	1	0	2	3	0	5
Tygerberg	0	0	0	1	1	1	—	1	0	2	2	0	4
Drakenstein	0	0	0	0	1	1	1	1	—	3	1	0	4
SWSC	0	0	1	0	0	1	—	1	—	2	1	0	3
NWSC	0	0	1	0	0	1	1	—	1	3	1	0	4
LWSC	0	0	0	0	0	0	—	1	1	2	0	0	2

Source: AICD WSS Survey Database, 2007.

Note: The utility scores 1 against a specific criterion according to:

[1] Cost Recovery: O&M cost recovery

[2] Cost Recovery: Capital cost recovery

[3] Efficiency: No fixed charge or minimum consumption charge

[4] Efficiency: Metering ratio is higher than sample average (77%)

[5] Efficiency: The price of the last block meets the capital cost

[6] Small piped consumers (at 4 m^3) pay less than average piped consumers (at 10 m^3)

[7] Standpost consumers pay less than small piped consumers (at 4 m^3)

[8] Connection cost as share of GNI per capita is lower than sample average (27%)

[9] Residential consumers pay less than nonresidential consumers at 100 m^3 of consumption

— = data not available.

About AICD

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 will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a better empirical foundation for prioritizing investments and designing policy reforms in Africa's infrastructure sectors.

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

AICD was commissioned by the Infrastructure Consortium for Africa after the 2005 G-8 summit at Gleneagles, which recognized the importance of scaling up donor finance for infrastructure in support of Africa's development.

The first phase of AICD 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 is expanding to include as many other 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.

The World Bank is implementing 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, the Development Bank of Southern Africa, and major infrastructure donors.

Financing for AICD is provided by a multidonor trust fund to which the main contributors are the U.K.'s Department for International Development, the Public Private Infrastructure Advisory Facility, Agence Française de Développement, the European Commission, and Germany's KfW Entwicklungsbank. 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. 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 data underlying 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. Inquiries concerning the availability of data sets should be directed to the editors at the World Bank in Washington, DC.