



**African Development Bank**

**Guidelines for User Fees and Cost Recovery  
for Urban, Networked Water and Sanitation Delivery**

## PREAMBLE

The African Development Bank Group's vision has development and poverty reduction as a central goal. Inadequate access to water supply and sanitation is a cause and consequence of poverty; likewise, inadequate water resources can become a constraint to improved health, agricultural development and food and energy security. Development of water resources will have a vital role in socio-economic development in Africa, while making a substantial contribution to the fight against poverty.

In order to address the impending water crisis, the Bank Group has made several interventions. Adoption of the Integrated Water Resources Management Policy (IWRM), preparation of the African Water Vision (AWV) and the Framework for Action (FFA), promotion of the establishment of the African Water Facility (AWF) and implementation of the Rural Water Supply and Sanitation Initiative, among others, are some of the major interventions undertaken by the Bank in recent times. In addition the Bank was given the lead responsibility of developing and implementing the NEPAD water infrastructure program, which includes water resources development.

A key aspect of managing scarce water resources is to understand the economic value and financial cost of water systems. Few Regional Member Countries have realistic policies, operational strategies or plans for cost recovery and sustainable financing for increased service coverage, particularly for the poor. Due to the lack of systematic knowledge, strategies for cost recovery are typically not comprehensive and address only some aspects of sustainability. This leads to the degradation of water supply, sanitation and irrigation systems, resulting in failure to deliver reliable services to users.

The Guidelines on User Fees and Cost Recovery for Water, Sanitation and Irrigation Projects, set in the context of the African Development Bank's Integrated Water Resources Management Policy (2000), have been prepared to assist Regional Member Countries (RMCs), service providers and RMCs investors working in project formulation and appraisal, sector and policy analysis in the water supply, sanitation, irrigation and related agricultural projects.

The Guidelines acknowledge the widely held view that water is both a social and economic good and have been designed to assist all stakeholders in the implementation of sustainable services which support all consumers and users of water.

This document, one of three complementary documents, addresses the issues of urban, predominantly networked, water supply and sanitation. The other two documents consider (i) rural, non-networked water supply and sanitation, and (ii) irrigation services. Summary guidelines are also available for each of the three service offers.

## EXECUTIVE SUMMARY

The African Water Vision targets achievement of 95% access to drinking water supply and sanitation by 2025, whilst the more imminent Millennium Development Goals' targets with respect to water and sanitation services are *“to reduce by one half, by the year 2015, the proportion of people who do not have access to safe drinking water and basic sanitation”*. The water and sanitation situation in Africa remains poor, with the region hosting one-third of the world's population without access to drinking water supply. Only about 60% of the total population in Africa had access to water and sanitation as of 2008, according to UNICEF/WHO's Joint Monitoring Programme. As a result, approximately 210 million people in urban areas will need to be provided with access to water supply services, and 211 million people with sanitation services, if the international coverage targets of the MDG for 2015 are to be met. A similar number of people in rural areas will also need to gain access. Using the most basic level of service and technology, the 2015 targets for rural areas could be attained at an extra annual investment cost estimated at about USD 1.2 billion.

The Bank's IWRM policy explains that the water sector is expected to fulfil social, environmental and economic needs. In a context of growing water scarcity, exacerbated by rapid population growth and urbanization, misallocation of resources, environmental degradation, and mismanagement of water resources, the Bank Group and its Regional Member Countries (RMCs) face new challenges which call for a new approach to water resources management. Water is a single resource with many competing uses. Experience has demonstrated that water management is both complex and multi-level, and requires a comprehensive framework. This analytical framework would facilitate the consideration of interconnections between the ecosystem and socio-economic activities in river basins. A sectoral or sub-sectoral approach should therefore be replaced by an integrated approach, which takes into account social, economic, and environmental objectives, assesses water resources within each basin, evaluates and manages water demand, and seeks stakeholders' participation. This vision is now widely accepted.

One of the major challenges in scaling up sustainable delivery of drinking water, sanitation and irrigation services is the constraint of financial resources, for both investment and operations and long-term maintenance purposes. Since funding by governments (from taxes) and international development agencies (transfers) is limited, there is an increasing attempt at mobilizing financial resources from the users through tariffs. Increased user financing also improves the prospects of financial sustainability. Moreover, the issue of user fees and costs for sanitation services has not been comprehensively tackled so far by most RMCs. Financing sanitation presents a particular challenge because finance often comes from two sources: the individual or household for onsite sanitation and an external source such as government for sewerage systems. However, owing to social/public health objectives, environmental concerns and political reasons, subsidies are often provided for sanitation services.

To keep up with the rapid increase of population and achieve food security by 2015, agricultural production in the region must increase at an annual rate of 6%. This implies that, substantial new investment in agriculture is needed to meet targets for poverty alleviation and food security. The Food and Agricultural Organisation (FAO) estimates that about 75% of the

growth in crop production in Sub-Saharan Africa required by 2030 will have to come from intensification. Since irrigation and other forms of agricultural water management are the key to intensification, it is also clear that much of the required new investment must be in agricultural water development.

Statistics also show that lending for irrigation in Sub-Saharan Africa (SSA) declined considerably in the 1990s and 2000s. Though there could be various reasons for this decline, the common denominator is the disappointing performance of development to date in terms of sustainability and returns on investment. Some RMCs do not charge any user fees for agricultural purposes. On the other hand there is no uniformity in regard to the principal considerations adopted by the RMCs in fixing user fees for irrigation water.

The overall objective of recovering costs, financial and economic (operating expenditure, capital maintenance, cost of capital, indirect sector support costs including environmental and economic regulation and resource opportunity costs) is desirable in the context of IWRM. In particular economic and financial costing of water in its various uses guides appropriate allocation of water resources and assures appropriate waste water management according to polluter pays principles. However, many factors come into play while trying to make this objective operational.

First, the point of departure varies by country, sector, and sub-sector: in some cases cost recovery is extensive and well established and effectively implemented at some level (eg recovery of full operating expenditure and a degree of capital maintenance costs in some sectors in Morocco). In other cases, cost recovery may be minimal - either through lack of policy commitment to the objective or poor implementation of policy.

Second, notwithstanding the goal of integrated water resources management, there is variation by sector and sub-sector in what is feasible. For example, the potential to recover costs is high in *productive* sectors such as irrigation - where cash incomes should increase by significantly more than the full cost of investment. Significant cost recovery is also possible in urban water supply, though usually requiring modest cross-subsidies. Whilst remaining possible, it has been limited in many sanitation investments, other than those undertaken directly by households.

Third, willingness to pay (and willingness to charge) is a related issue which varies by country and within countries (urban/rural) and by technology (networked/non-networked water and sanitation services).

In sum, these factors create a continuum of contexts and opportunities for cost recovery interventions, which in turn influences what is feasible and desirable and the timescale that may be required to meet specified policy objectives. These three Guidelines, through a step-by-step approach, will facilitate progress in such diverse cases. The bottom line is that failure to attain financial sustainability of water, sanitation and irrigation projects will greatly hinder scaling-up and therefore hinder achievement of the MDGs for the water sector.

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The Water Partnership Program (WPP) promotes effective water management policies and practices at regional and country levels. It operationalizes the African Development Bank's Integrated Water Resources Management policy in the Bank's regional member countries.

WPP pursues its goal through the generation and dissemination of a range of knowledge products, fostering dialogue on key sector issues and promoting partnerships that enhance knowledge sharing. The Guidelines presented here touch upon a very critical issue for all rural water sector investments: how to build rural water and sanitation infrastructure that is, first and foremost, financially sustainable, in addition to being environmentally and socially sustainable?



Canadian  
International  
Development  
Agency

Agence  
canadienne de  
développement  
international



Water Partnership Program WPP: The African Development Bank,  
Temporary Relocation Agency (TRA), 13 Avenue du Ghana, BP 323,  
1002 Tunis Belvédère, Tunisia  
Tel. +216 71 10 39 00 - [www.afdb.org](http://www.afdb.org)

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## STRUCTURE OF THE GUIDELINES: HOW TO USE THIS DOCUMENT

The three complementary Guidelines on Urban Water and Sanitation (Watsan), Rural Watsan and Irrigation, are designed to meet the needs of all stakeholders, service providers and investors working in project formulation and appraisal, sector and policy analysis in the water supply, sanitation, irrigation and related agricultural projects. The Guidelines include practical checklists to ensure consideration of the IWRM objectives in project preparation as well as sectoral analysis.

Regional Member Countries (RMCs) of the African Development Bank (AfDB) have a range of policies, operational strategies or targets for setting user fees. There is also considerable commitment to poverty alleviation in the region and recognition of the limited ability of many to pay for services. Therefore any IWRM policy should be implemented progressively. This situation has important implications for the design of these Guidelines: user fee systems are usually founded on a combination of policies and long-standing practice.

Approaches to national, regional and specific location tariff setting vary widely. Where investments are local and project-specific, this can create a tension in that it can be unrealistic to expect significant changes in national policy on the basis of a single investment operation, which in the national and sectoral context may be relatively small. Production and implementation of the Guidelines is intended to help stakeholders in Africa have a common basis to engage on the issue of cost recovery and setting charges.

The Guidelines are divided in two main parts: the Guidelines and the Knowledge Resources (see figure on next page).

Each of the three complementary documents discusses one of the three main sub-sectors: (i) Networked and/or urban water supply and sanitation, (ii) Non-networked and/or rural water supply and sanitation and (iii) Irrigation.

## **PART 1 GUIDELINES**

### **1. Purpose of the Guidelines**

This section lays out the purpose of the User Fees and Cost Recovery Guidelines. It explains the main concepts and how both user fees and cost recovery are relevant to achieve different purposes.

### **2. Guidelines for user fees and cost recovery: the five steps and summary checklist**

Section 2 comprises the core of the Guidelines. It includes details of the main sets of principles and steps relating to the process of setting user fees and cost recovery.

### **3. Guidelines for networked and/or urban water supply and sanitation - *this document***

Section 3 outlines the main steps for setting user fees and cost recovery for urban water supply and sanitation

## **PART 2 KNOWLEDGE RESOURCES**

### **4. Review of ADB user fees and cost recovery policies**

### **5. Review of other Bank's policies on user fees and cost recovery policies**

### **6. Summary of country experiences and literature on user fees and cost recovery**

### **7. Knowledge resources on networked and/or urban water supply and sanitation**

Part 2 provides access to country experiences and literature review on cost recovery and user fees for each of the sub-

## TERMINOLOGY

Various terms are used in the literature as well as in project documents. The Guidelines try to use the following terminology consistently:

<p><b>USER FEES (SERVICE CHARGES OR TARIFFS)</b></p>	<p>Includes any payments made by beneficiaries which are required because the service is provided - these include direct payments for actual service (e.g. charges per cubic meter of water delivered); fixed charges (e.g. a charge for being connected to a water or drainage service), or an increased land tax because irrigation services are available. User fees, service charges, customer charges, tariffs, prices are all used here to describe the same concept.</p>
<p><b>SOCIETAL CONTRIBUTIONS</b></p>	<p>Contributions to financial sustainability from national taxation (and international taxation or transfers, through donor intermediation) for both indirect support costs, capital expenditure and, more rarely, operating expenditure.</p>
<p><b>SERVICE COSTS</b></p>	<p>Includes the range of expenses incurred in providing water services - routine operation and minor maintenance expenditure; capital expenditure (cost of construction and long-term capital maintenance of facilities) plus costs of financing that capital expenditure. Direct support costs, overheads and appropriate levels of regulation may also be included in service costs.</p>
<p><b>COST RECOVERY</b></p>	<p>Measures the extent that user fees and any other direct contributions, for example voluntary labour, are adequate to meet service costs. Financial sustainability describes the extent to which society as a whole (including international society) contributes in a committed, long-term manner to support services, either through full cost recovery through user fees or through a combination of user fees and societal contributions.</p>

The sub-sectors definitions used throughout the Guidelines include:

<p><b>NETWORKED AND/OR URBAN WATER SUPPLY</b></p>	<p>Refers to conventional piped water supply comprising abstraction (from ground or surface water), some form of treatment and distribution to households, commerce and industry. Although described as urban this conventional water supply approach is also used in secondary towns and in some rural areas where economic wealth or water scarcity begin to justify the investment in networked provision. A networked and/or urban water supply system <i>anticipates a ‘customer orientation’ in the supply of services where cost reflective tariffs are viable.</i></p>
<p><b>NETWORKED AND/OR URBAN SANITATION</b></p>	<p>Refers to piped waste water collection (sewerage), treatment and disposal, combining a number of houses or sources of waste. The waste network might discharge directly to a convenient water course but preferably, if less affordably, the waste will receive some form of treatment, with possible levels including primary (sedimentation), secondary (biological treatment) and most unusually tertiary where there is a demand for immediate re-use. Treatment processes also necessarily include some level of sludge treatment, sludge being the concentration of solid and precipitated parts of the sewage, including the waste from the treatment processes. A networked and / or urban sanitation system <i>anticipates a ‘customer orientation’ in the supply of services where cost reflective tariffs are viable.</i></p>
<p><b>NON-NETWORKED AND/OR RURAL WATER</b></p>	<p>Describes point sourced water with no piped distribution system. The point source can be a borehole, a well, a spring or a rainwater catchment tank. Water is transferred to homes by carrying using various modes, including by carts. In the context of these Guidelines on cost recovery, rural and/or non-networked water tends to refer only to human powered abstraction methods, handpumps for example, where operation costs are minimal. For this reason gravity flow water systems are included in this category even though they may develop into networks delivering to houses. Some urban areas, particularly secondary towns and peri-urban areas, also access water through point sources and therefore require a similar approach to cost recovery. In larger urban areas these point sources may be seen as part of the transition to accessing the conventional piped network. <i>It anticipates a ‘community orientation’ towards the supply of services where community involvement and contributions may be more significant than direct user fees.</i></p>
<p><b>NON-NETWORKED AND/OR RURAL SANITATION</b></p>	<p>Refers to on-plot and on-site sanitation which is also widely used in many urban areas. On-plot sanitation refers to the various types of pit latrine and septic tank which dispose of human wastes within the boundaries of the housing plot. On-site sanitation might include a limited network from a small number of households discharging to a communal septic tank or treatment pond on the housing site. <i>It anticipates a ‘household orientation’ towards the supply of services where direct household payments for services delivered are more significant than ongoing user fees.</i></p>

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Other terms used in the Guidelines include:

<p><b>Value of water</b></p>	<p>Willingness to pay for water and sanitation services; computed time, convenience and health benefits. Incremental income received by the farmer as a result of irrigation services, divided by the quantity of irrigation water used.</p> <p>Wider externalities or values that society believes should be recognised as part of the value of water, particularly related to scarcity and ecological and environmental sustainability.</p>
<p><b>Sustainability</b></p>	<p>'Sustainable development is the management and conservation of the natural resources base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations.' (FAO, 1988).</p> <p>Seven criteria for water sustainability recognised in AfDB policy and toolkits:</p> <ol style="list-style-type: none"> <li>1. Guaranteed access to basic amount of water for human health - quantity</li> <li>2. Basic water requirements</li> <li>3. Quality standards</li> <li>4. Renewability of water resources</li> <li>5. Data collection and dissemination</li> <li>6. Institutional mechanisms to prevent water conflicts</li> <li>7. Water planning and governance</li> </ol>
<p><b>Economic objectives</b></p>	<p>The efficient allocation of resources is an important consideration in developing pricing policies for services. Economic theory suggests that optimum allocation of resources is achieved when price equals the marginal cost of supplying the service, which is the increment to total cost of producing and delivering an additional unit of output under specified circumstances. While this situation is rarely, if ever achieved in practice, the idea that water, a scarce good, should not be wasted and that reallocation from low- to high-value uses should be encouraged is an important concept in formulating user fees.</p> <p>Economic theory also highlights important divergences between economic costs, social costs and, environmental impacts (due for example to external effects) which should be taken into account.</p>
<p><b>Financial objectives</b></p>	<p>Full financial sustainability implies that the agency has access to sufficient revenues and societal contributions to cover operating and minor maintenance costs, capital maintenance costs, debt service on loans and dividend payments on equity capital where required. In addition there is a need to ensure 'financeability', that is the ability to generate sufficient funds to ensure adequate interest cover on loans, to meet the timing or cash flow requirements for repayments of debt capital and to be able to finance a proportion of capital expenditures from internally generated funds. Where service providers or utilities operate commercially the rate of return on assets is a useful test of their financial sustainability.</p> <p>The extent to which this criterion is met through user fees varies widely across countries and sectors. In general, the more commercial utilities (telephones, power) come closest to financial sustainability through cost reflective user fees, while other sectors - especially rural water supply, sanitation, and irrigation - have tended to be more dependent on support from government. These Guidelines support the move towards achieving financial sustainability through user fees, recognising that demands on government resources are such that support is not always forthcoming, particularly for the critical component of capital maintenance.</p>

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<b>Service differentiation</b>	In water supply, sanitation and irrigation there are a wide range of technologies that can be chosen by users and consumers to best fit their particular needs, affordability and willingness to pay. This range is generally more extensive than recognised, for example in urban water there is not simply the choice between standposts or conventional house connections but the possibility of group connections, street connections, prepaid meters, informal connections etc which can provide a higher level of service than standpost kiosks but at a lower cost than conventional connections.
<b>Price differentiation</b>	Price differentiation is used to describe tariffs that reflect the potentially lower costs of the service differentiation approach and also describes the use of tariffs that benefit from cross-subsidies within the sub-sector aimed at the particular needs of different segments of the population, for example a lower tariff for low-income users.
<b>Cost reflective charging or pricing</b>	The principle that for economic and allocative efficiency total direct user fees should 'reflect', that is be approximately equal, to total service costs.
<b>Cost reflective revenue distribution</b>	Revenue (collected under cost reflective pricing) should be distributed/shared out to reflect the costs incurred by the organisations involved in service delivery, both direct and indirect.
<b>Operating and minor maintenance expenditures (Opex)</b>	Expenditure on labour, fuel, chemicals, materials, plant & equipment, purchases of any bulk water. These will be detailed for each of the sub-sectors. There is some uncertainty as to what to include in opex, i.e. the distinction between minor maintenance and capital maintenance as well as the issue of what overheads or support costs should be included.
<b>Capital expenditure (Capex)</b>	Expenditure on new fixed assets or expenditure on enhancing the quality or service of an existing system of fixed assets
<b>Capital maintenance charges/ expenditure (CapManex)</b>	Expenditure on asset renewal and replacement, based upon serviceability and risk criteria. Accounting rules may guide or govern what is included under capital maintenance and the extent to which broad equivalence is achieved between charges for depreciation and expenditure on capital maintenance.
<b>Support costs</b>	Expenditure on direct support costs such as environmental and economic regulation including customer involvement costs. These will be detailed for each of the sub-sectors. Indirect support costs such as capacity building at a national scale are not considered.
<b>Cost of capital</b>	Expenditure on the weighted average cost of capital (see Toolkits for Financial Governance, 2005) representing interest payments on debt and dividend payments to the equity providers, weighted according to the balance of debt and equity. Note that not all providers of capital will be requiring these returns on their contribution (grant funds for example) but there is then an opportunity cost of that capital which needs to be recognised.
<b>Depreciation</b>	An accounting measure of the extent to which the value of fixed assets have been used up in any particular period in the provision of services. Where fixed assets are required to continue facilitating that service 'in perpetuity' the depreciation charge should equate to the cost of long-term capital maintenance.
<b>Amortization</b>	Amortization relates to the financing of capital investments and describes the regular payments to providers of finance of interest on the debt and phased repayments of the principal or capital borrowed.

**PART 1**

**GUIDELINES FOR USER FEES AND COST RECOVERY FOR URBAN,  
NETWORKED WATER AND SANITATION PROJECTS**

# 1 RATIONALE AND PURPOSE OF THE GUIDELINES

1. The African Water Vision proposes achievement of 95% access to drinking water supply and sanitation by 2025, whilst the more imminent Millennium Development Goals targets with respect to water and sanitation services are “to reduce by half, by the year 2015, the proportion of people who do not have access to safe drinking water and basic sanitation”. The present water and sanitation coverage in Africa is poor, only about 60% of the total population in Africa has water and sanitation coverage. As a result, approximately 210 million people in urban areas will need to be provided with access to water supply services, and 211 million people with sanitation services, if the international coverage targets of the MDG for 2015 are to be met. A similar number of people in rural areas will also need to gain access. Rural development is similarly dependent upon the growth in agricultural output of which irrigation is a key component. The AfDB is committed to supporting Regional Member Countries in delivering improved water, sanitation and, as required, irrigation services to all.

2. Sector experience gained since the huge investments of the 1980s water decade dictate that sustainability is key to achievement of the MDGs for water, sanitation and elimination of hunger through irrigated agriculture. In particular, a robust cost recovery system is necessary for achievement of financial sustainability of projects and programmes in the water sector.

3. This section outlines the context in which these Guidelines have been developed. It explains why, who and how the Guidelines might be used within the framework of the AfDB and its support to Regional Member Countries.

## 1.1 Purpose of the Guidelines

4. User fees have an important role in meeting social, economic and environmental policy objectives. User fees, and their structure, provide signals to users about the cost of the service, the scarcity of resources used to provide the service, and the priorities that governments place on provision of services to particular groups. At a minimum, user fees for cost recovery provide the basis for financial sustainability: failure to provide for adequate funding leads to the degradation of systems, deteriorating performance and services, and unwillingness to pay - a commonly observed vicious circle.

5. In 2000, the Bank produced an Integrated Water Resources Management (IWRM) Policy statement. The policy stated that getting the prices right is at the very core of improving water resources management. Among others, the policy states that:

- a) In the context of increasing water scarcity, economic cost pricing, including recognition of opportunity cost, should be used as a basis for water allocation decisions;
- b) The aim of water pricing should be economic cost recovery, taking into account social equity and capacity to pay by the rural and urban poor. Initially however Regional Member Countries (RMCs) should target the recovery of full financial cost.
- c) The Bank will support RMCs’ strategies to develop appropriate water pricing policies.

6. The IWRM policy sets aspirational goals of full economic cost recovery, with pricing at the core of improving water resources management - but notes that full financial cost recovery is a more immediate goal, and that “lifeline” water supplies should be available at affordable prices.

7. The implications of the wide spectrum of national, sectoral and local situations that the Bank faces - and must take account of in its operations - is clearly recognised. The time frame for full financial cost recovery may necessarily vary between countries just as the extent of RMC’s water pricing policies are at different stages of development. However, these Guidelines recognise that a certain minimum level of user fees, described further for each sub-sector, are crucial to ensure service sustainability.

## 1.2 Water user fees for cost recovery

8. The policy, and particularly the practice, of cost recovery are central to any country’s delivery of water, sanitation and irrigation services. The purpose of these Guidelines is to establish a framework for stakeholders to work towards best practice in cost recovery so as to deliver the best possible sustainable service delivery to customers and consumers. The Guidelines are a critical component of achieving sustainability in the Millennium Development Goals.

9. The goals of user fees and cost recovery are:

- to ensure sufficient revenue to deliver services over the long term;
- to ensure sufficient revenue to support improved quality of services;
- to ensure sufficient revenue to support extending service coverage, particularly to serve low-income consumers;
- to ensure better use of scarce water resources and management of waste water disposal to conserve the natural environment by signalling to consumers the cost to the economy of the resources used by the services.

10. Lower-income countries have traditionally supported their public water and sanitation providers through budgetary grants (from taxes) and low-cost loans (supported via transfers), not expecting or requiring full cost recovery. The result has usually been a poor quality of service, accessed mainly by higher-income households with governmental support nearly always less than anticipated leading to weaknesses in operations and maintenance. The focus of the direct providers has then tended to be on meeting the needs of government as the providers of finance, rather than on customers and their interests. In addition to the subsequent poor quality of service, the lack of sufficient revenue always impacts upon long-term capital maintenance such that the next generation of consumers will have to fund an even greater proportion of rehabilitation costs. Moreover, absence of a credible cost recovery system means that the service provider cannot deliver needed maintenance, leading to deterioration of services.

11. Approaches towards cost recovery for Africa RMCs need to recognise the economic and institutional environment in which client countries are operating. It is the goal of lending agencies to improve water and sanitation service provision faster than the rate at which such services might normally have developed in order to accelerate growth in economic development as well as improving the health of poor households. These Guidelines therefore seek to enable service providers to deliver better services to all, within the context of a protected environment, through accessing enhanced revenue flows whilst acknowledging that full cost recovery might not always be achievable everywhere at low levels of economic wealth. In this context it is recognised that part of the process of moving towards cost recovery has to be through ensuring that appropriate service levels and technologies are chosen, or differentiated, such that users obtain the services they desire and are willing to pay.

12. Differentiated services may not necessarily equate to conventional service standards but will be chosen by consumers, users and households as the level at which they recognise benefits for which they are willing and able to pay. Where there are significant externalities, benefits to society as a whole which have not been captured through customer and user oriented service choice, then the role of societal contributions should be considered. This is not the same as subsidising inappropriately chosen levels of services. The notion of “one size fits all” has not worked in the water sector, hence the idea of service and price differentiation.

### 1.3 Constraints in the implementation of user fees in RMCs

13. In many African countries the principle of paying for utility services such as power supply and telecommunications is relatively well established. This is not so however with respect to sewerage and water services - including irrigation. Key constraints include:

- The widespread tendency for people to believe that water is a free good, provided by nature and therefore free to consumers.
- Second, some RMCs have traditionally provided free or subsidized water so that user charges are now resisted, consumers having perceived that past prices represented present values.
- Third, because water is a basic human need, there is an appropriate desire that a minimum should be provided to sustain life, regardless of the income level of the beneficiary.
- Fourth, since provision of sanitation services has health benefits beyond the individual consumer, to society as a whole, it is often argued that direct recovery of costs is inappropriate. This is often used to justify subsidising access to sewerage by the rich rather than on-plot sanitation for the poor for whom the health benefits are higher.
- Irrigation, which provides direct financial benefits to users, is less susceptible to the public good argument. However there is considerable variation in the extent to which irrigation providers perceive the provision of dams and bulk water transfers to be part of service provision to be recovered from users.

Despite the above constraints, the water sector in Africa has undergone considerable reforms in the recent past, and many RMCs have successfully revised their national water policies to cope with today's realities. These Guidelines will further complement initiatives by RMCs who are already implementing water sector reforms.

14. The **multiplicity of objectives** and the trade-offs involved make the subject of services pricing controversial. Much of the controversy arises from the lack of consensus on the boundaries to be drawn between the role of utilities as instruments of government's social and economic policies, and utilities or service providers as commercial ventures. The implications of economic, financial and policy objectives may conflict in particular instances, and pricing decisions may involve trading off one objective against another.

15. In addition to the above mentioned constraints at country level, the present process of project appraisal in the Bank tends to introduce financial and economic analysis at too late a stage - generally after technical, physical and organizational definition of the project. Rather than being an integral part of project design - testing the feasibility of project design against economic, financial, and cost recovery criteria - the economic and financial review is effectively an ex-post check that the project meets broadly defined viability criteria but provides no assurance of financial sustainability. These Guidelines stress the iterative nature of checking anticipated user fees against proposed service levels and the necessity to reconsider service levels when subsequent willingness and ability to pay indications are that such services will not recover costs.

16. Bank loans should, whenever appropriate, set out the agreed approach to user fees and establish the basis on which financial sustainability is to be ensured. Any such agreement presupposes the existence of an efficient accounting system capable of making reliable data available on a timely basis; clear policy and appropriate legal support to proposed user fees; and adequate enforcement procedures.

17. An existing study covers<sup>1</sup> standards and procedures for financial accounting that are comprehensive in scope and fully adequate to guide financial accounting aspects of ensuring overall revenue sufficiency - once the scope of an approach to cost recovery has been identified. However, the Guidelines for Financial Governance and Financial Analysis of Projects say little about reasonable or acceptable levels of subsidies, potentially between different groups of consumers, between regions, between sub-sectors, between rural and urban and between countries.

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<sup>1</sup> Source: Toolkits for Financial Governance and Financial Analysis of Projects, African Development Bank, 2005

## 2 GUIDELINES FOR USER FEES AND COST RECOVERY: THE FIVE STEPS

18. The structure of the Guidelines reflects the interdependent framework of issues that should be addressed in formulating a successful user fees and cost recovery system. The five steps involved relate to the Policy Economic and Institutional Environment; Setting Cost Recovery and Service Objectives; Investment Planning Costing & Appraisal; Determining Revenue Requirements and the Basis for Charging User Fees; and Implementation of User Fees.

Country programme assessment	STEP 1	The Policy, Economic and Institutional Context	<ul style="list-style-type: none"> <li>Country Policy and Institutional Assessment: what is the political and economic environment, the existing situation of the country regarding average income levels (GDP per capita and Gini index), trends in growth rates, urban and rural, and therefore the likely future required and desired services and the potential for cost recovery.</li> <li>Policy and institutional environment, the laws and formal statements of policy by relevant authorities and other government ministries which govern the specification of user fees and cost recovery. Is there a need for these to be reviewed?</li> </ul>
Sector review, project identification & feasibility	STEP 2	Setting Cost Recovery and Service Objectives	<ul style="list-style-type: none"> <li>What quality and quantity of services are desired by users and consumers, both present and potential?</li> <li>Can services be delivered through alternative, differentiated, modes of provision?</li> <li>What is the affordability and willingness to pay for services at various levels of provision?</li> <li>Feasibility of the primary objectives of service delivery - social, economic, financial, environmental?</li> <li>Existing RMC &amp; AfDB policy on setting cost recovery targets from user fees. Are these in agreement - do they need to be reviewed?</li> <li>Are there any possibilities of inter-sectoral/multi-use/alternative uses of water and what are the implications for water allocation? Are there any resulting implications for charging?</li> </ul>
Project preparation and appraisal	STEP 3	Investment Planning, Costing & Appraisal:  Determining Revenue Requirements	<ul style="list-style-type: none"> <li>In appraising a project, its technical, financial, economic, social, environmental, production, management and loan conditionalities are closely examined according to the Toolkits for Financial Governance &amp; Analysis of which these Guidelines are a sub-set.</li> <li>Specifically the total revenue requirements have to be understood: operating and capital maintenance expenditures and costs of capital.</li> <li>How is the total amount to be recovered calculated? Is there adequate accounting capability to ensure long-term understanding?</li> <li>What are the future costs required to ensure sustainability?</li> <li>Is there a justifiable need (national, local, interests) for extra-sectoral subsidies?</li> </ul>
	STEP 4	The Basis for Charging User Fees	<ul style="list-style-type: none"> <li>What will be the basis for computing the specific user fees (fixed charges, volumetric charges, for example) and for sharing the total revenue burden between different consumer segments?</li> <li>To what extent can existing patterns of charging be adapted to ensure financial cost recovery?</li> <li>Is there sufficient willingness and ability to pay these user fees? If not, reconsider service objectives and modes of provision.</li> </ul>
Project design and implementation	STEP 5	Implementation	<ul style="list-style-type: none"> <li><b>Project level:</b> Sources of finance and payment mechanisms: Who will pay? When? Who will collect charges, How often? Where (how available)? What sanctions will apply for non-payment? Is there a need for revised local legislation to enforce compliance? Are the costs &amp; revenues being properly accounted for?</li> <li><b>Macro level:</b> What can governments do? How can policies and practices regarding a move towards cost recovery be introduced whilst involving users so as to maintain their trust and commitment to ensure long-term sustainability? What are the mechanisms for monitoring and evaluating</li> </ul>

			<p>the progress towards cost recovery? If extra-sectoral subsidies are required are they being transferred?</p> <ul style="list-style-type: none"> <li>• <b>External level:</b> What is the advocacy role of AfDB and other external agencies in supporting the move towards user fees and cost recovery? Are any loan conditionalities being monitored and enforced regarding user fees?</li> </ul>
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19. This framework is in part hierarchical. Step 1 - the Policy, Economic, and Institutional Environment - will define the context in which the rules and procedures for setting water service charges are determined and should provide guidance on the principles to be followed. Often there will be gaps in the policy environment so that clarification of key issues is a precondition to any further progress. Sometimes the process will be iterative - for example, if charges based on volume of water delivered are planned, the infrastructure must be reviewed and perhaps upgraded to ensure that accurate measurement at the desired points in the system is feasible.

20. The outcome of the entire cost recovery process must be a system that meets defined objectives while being internally compatible with governing legislation in addition to being technically feasible and responsive to user and consumer interests. The process should therefore consider political, legal, administrative, technical and operational aspects - as well as ensuring acceptance by stakeholders beyond the immediate users.

21. The policy, economic, and institutional environment is relatively common for the three main sub-sectors, urban water and sanitation; rural water and sanitation; and irrigation and drainage, each of which can be accessed in the complementary documents.

## 2.1 Summary check-list: Networked and/or urban water & sanitation

22. The five steps in formulating a successful user fees and cost recovery system for networked and or urban Watsan delivery and the relevant issues to be addressed are presented below.

Country programme assessment	STEP 1	<p>The Urban/ Networked Policy, Economic and Institutional Context</p>	<p>Economic condition and average income levels (GDP per person and Gini index); Trends in urban growth rates, including 'suburban', 'peri-urban' and slum growth; Policy and institutional environment, laws and formal statements of cost recovery policy by relevant authorities; Country Policy and Institutional Assessment - likelihood of political support for accelerated move towards cost recovery; Stakeholder analysis - likelihood of support/opposition to enhanced cost recovery; Is there a semi-autonomous economic regulator? What level of independence? If none, what are the plans to introduce this capacity? Is there any system of comparative competition between direct (service) providers in the country to promote efficiency?</p>
Sector review and project identification	STEP 2	<p>Setting Urban/ Networked Cost Recovery and Service Objectives</p>	<p>Existing policy on setting cost recovery targets from user fees            What are the primary objectives of service delivery in this context - social, economic, financial, environmental?            To what extent should attainment of desired cost recovery target be time-extended?            What are the existing levels of efficiency of the direct service provider?            What is the existing financial situation of the direct service provider? (ROFA?)            What are the existing levels of service provision - water and sewerage?            What is the existing level of subsidies to average customers of water? And sewerage?            How costly is access to bulk water?            What levels of service are being accessed by the poorest?            Is there a need for social mapping?            What quality and quantity of services are desired by users and consumers, both present and potential?            Can services be delivered through alternative, differentiated, modes of provision?            Does the service provider need to be introduced to concepts of service and pricing differentiation?            What, if any, are the restrictions on serving 'illegal slums'            Affordability and willingness to pay for services at various levels of provision, particularly in the slums?            Is there a need for detailed user surveys and focus groups in the slums?</p>

Project preparation and appraisal	STEP 3	<p><b>Investment Planning, Costing &amp; Appraisal:</b></p> <p><b>Determining Urban/ Networked Revenue Requirements</b></p>	<p>Understanding total revenue requirements;          What are present operating expenditures, capital maintenance expenditures, costs of capital? What should they be at present service levels? What should they be at proposed service levels?          Have these costs incorporated direct support costs?          What is the average inflation rate? Is the direct service provider/regulator/government prepared to accept indexation of user fees?          What is the 'Pc', catch-up percentage necessary to achieve cost recovery at existing service levels?          What is the '-X' potential utility efficiency percentage?          What is the 'C' percentage necessary to achieve MDG service coverage to the poor?          What is the 'Q' percentage necessary to achieve desired environmental quality enhancement?          What is the 'V' percentage necessary to achieve acceptable security of supply (and/or possible move towards 24/7 supply)?          What is the 'S' percentage to achieve any desired improvements in customer service levels?          What are the future costs (long run marginal cost) required to ensure water resources sustainability?          Is the country investing sufficiently in indirect support costs?          Is there a justifiable need for extra-sectoral subsidies, particularly related to the time-spread of achieving cost recovery?</p>
	STEP 4	<p><b>The Basis for Charging Urban/ Networked User Fees</b></p>	<p>What is the basis for charging user fees?          Volumetric fixed or variable; Flat-rate fixed or variable?          To what extent do the user fees reflect the principle of revenue adequacy, social fairness, water conservation and polluter pays, simplicity and enforceability?          If incremental block pricing is used are the sizing and pricing of the blocks appropriate?          Is there a lifeline block that is being accessed by too many users to the detriment of the utility's revenue stream?          Is it an appropriate time to re-consider the basis for charging?          Can the charges be simplified to aid customer's understanding and responsiveness?          Is there an appropriate balance in sharing the total revenue burden between different consumer segments?          Do consumers accessing water at kiosks pay a proportionate share of the costs?          Do the new connection fees allow/encourage access to the piped network by the poor?          To what extent are sewerage costs being recovered?          Are industrial/commercial users being charged according to polluter pays principle?          Is there sufficient enforcement to limit polluter pays avoidance?</p> <p><i>Is there sufficient willingness and ability to pay these user fees?          Have women, the poorest and the most disadvantaged been consulted separately?          If not, reconsider service objectives and modes of provision Step 2.</i></p>
Project design and implementation	STEP 5	<p><b>Implementation</b></p>	<p>Are any additional sources of finance required to ensure coverage to the poor?          Is there an adequate strategy to communicate to customers the reasons for moving towards full cost recovery?          What customer involvement mechanisms are planned?          Are there appropriate user payment collection procedures in place?          Can lower-income customers pay little and often?          Are there appropriate but enabling processes in place/planned for non-payment?          Is there any need for adaptation of local bye-laws to enforce compliance?          Is there a system of financial control, monitoring and evaluation of the development of user fees?</p>

## STEP 1: THE ECONOMIC, POLICY AND INSTITUTIONAL ENVIRONMENT

### 2.2 Economic environment

23. Promoting cost recovery through user fees as part of a donor supported project requires an understanding of the country economic conditions (Table 2.1), in particular average household wealth. This is most easily noted as Gross Domestic Income (Gross Domestic Product) per person or potentially, where remittances from overseas workers are significant, Gross National Income per person. This level of economic wealth is already recognised in AfDB's classification of RMCs and is an important predictor of possible levels of cost recovery. There is clearly an assumption that GNI per person is a fair reflection, or rather an approximation, of average wealth and may not be representative. However it is normally the most accessible approximation where countries may not have more accurate data.

24. To develop a project or programme it is therefore necessary to understand the breakdown of the population of a country between rural and urban and between formal urban and informal, illegal, slum and shanty urban. National statistics services might, in addition, give an indication of average household wealth for each of these groups which gives a first estimate of the scale of each service challenge as well as possible levels of affordability. The Gini coefficient describes the extent to which wealth is equally shared or skewed towards the rich in any country. This coefficient together with the relative proportions of the population in each of the main categories gives an idea as to the potential for cross-subsidies.

25. A third critical indicator is the 'Taxation to GDI' (GDP) ratio. This ratio not only illustrates the potential for supporting water and sanitation services through direct taxation (through budgetary support to the water and sanitation provider) but most importantly the likelihood of the sustainability of this source of finance. Some countries have achieved good water and sanitation services through fiscal support with only limited user fees. However, such successes are unusual, particularly in low-income countries and this approach does not assist in the IWRM goal of appropriate sharing of scarce resources based upon 'water as an economic good.' It is noted that the extent of the informal, untaxed, economy is not captured in the tax to GDI ratio. This is a further indication of the likelihood that sustainable services must depend upon user fees rather than societal contributions through taxation.

**Table 2.1: The economic environment**

	PRESENT INFORMATION	TREND/GROWTH RATE
GDI/GNI per person		
Gini coefficient		
Tax to GDP ratio		
Urban population %		
'Informal' urban population %		
Average household income formal urban		
Average household income informal urban		
Urban population living under \$1 per day %		

26. Not all the information in table 2.1 is required for all proposed projects, for example urban data is not required for irrigation but it can be useful for some rural water and sanitation projects and vice versa. This level of information is the minimum required to commence policy dialogue with an RMC and to begin project preparation which necessarily includes cost recovery objectives.

### 2.3 Policy and institutional environment

27. RMC Governments have legislation and policies with varying levels of detail regarding water resources management and services provision. These policies are the starting point for consideration of cost recovery, indeed they may even specify what is to be achieved and how. However, for good reason, many such laws and policies may also be recognised as aspirational. The country would like to achieve certain outcomes but is simply not in a position to do so at the moment due to limitations in capacity and economic resources.

28. The institutional pattern within the sector (or sub-sector) has to be recognised to understand the role of the various organisations, their legal responsibilities and authority, as well as the drivers that act upon them and influence the way in which they operate. This is particularly important for cost recovery issues as the determination of water tariffs is usually perceived to be critical in political terms. The organisational level at which cost reflective user fees might be calculated and approved, often requiring Ministerial (and even collective Ministerial) approval, is a factor in the likelihood of AfDB's involvement in promoting cost recovery being successful.

29. The Country Governance Profile (CGP), which identifies the strengths and weaknesses of governance arrangements in a country, and the Country Policy and Institutional Assessment (CPIA) should also be considered to the extent that they indicate the governance potential to allow for and even promote institutional autonomy sufficient to support a policy of cost

recovery for sustainability. These factors can be summarised in a simplified Activity and Responsibility Matrix shown in Table 2.2

**Table 2.2: The policy and institutional environment**

	COST RECOVERY GOAL	COST RECOVERY RESPONSIBILITY	INSTITUTIONAL AUTONOMY
Legislation regarding water resources and water and sanitation services, particularly clauses relating to cost recovery			
Formal policy regarding water resources and water and sanitation services, particularly relating to cost recovery			
Practice regarding water resources and water and sanitation services, particularly relating to cost recovery			
Organisations & specific policies regarding water resources and water and sanitation services, particularly relating to cost recovery			
Minister/Cabinet		E.g. final approval	
Ministry of Finance		E.g. views on cost recovery	
Central Government Ministry - Water Resources, Environment			
Central Government Ministry - Agriculture			
Central Government Ministry - Local Government			
Economic & quality regulator			
Environmental regulator			
Municipal/Local Government			
Direct service provider (public or private)			
Informal service providers			
Customer Committees - civil society for customer oriented, utility provision		Eg stakeholder discussions	
Community driven initiatives, community based organisations, Water User Associations - civil society for community oriented provision			

30. Ensuring financial viability has become a growing concern in lending to utilities and other programmes and projects. Losses in operations are widespread, both because of poor operational efficiency and improper pricing policy for the services they provide. Pilot projects cannot be taken to scale many times for these same reasons. The Bank is interested in developing and establishing viable institutions - indeed these institutions may be more important to long term development than the immediate resource transfer of the Bank's loan. For example, developing effective and efficient service providers, developing a viable economic regulator and giving an independent view of costs related to services might be a critical aspect of the Bank's contribution. Such institutions also begin to address the political context of

setting user fees and moving towards cost recovery. Politics and the challenge of adjusting user fees close to any elections is a global challenge which cannot be underestimated. Hence every opportunity should be taken to 'neutralise' the political aspect of setting user fees through, for example, not only facilitating independent reviews of pricing (economic regulation) but also through involving users and consumers, civil society and focused advocacy groups in the process of determining service objectives and subsequent fees.

31. Analysis of the institutional framework gives initial indications as to whether there are institutional weaknesses, gaps or even failures which need to be addressed to ensure viable institutions and the necessary supporting framework for service delivery and cost recovery.

32. Based upon this understanding of the economic, policy and institutional environment, common to each of the sub-sectors, it is necessary to consider the objectives and charging approaches separately.

### 3 GUIDELINES FOR NETWORKED AND/OR URBAN WATER SUPPLY AND SANITATION

[The preceding Section 2 is common to all the sub-sectors addressed by the Guidelines and should be read before this section].

#### 3.1 Definitions for networked and/or urban water supply and sanitation

33. **Networked and/or urban water supply** refers to conventional piped water supply comprising abstraction (from ground or surface water), some form of treatment and distribution to households, commerce and industry. Although described as urban this conventional water supply approach is also used in secondary towns and in some rural areas where economic wealth or water scarcity begin to justify the investment in networked provision. Networked and/or urban water supply anticipates a “customer orientation” in the provision of services where cost reflective tariffs are viable.

34. **Networked and/or urban sanitation** refers to piped waste water collection (sewerage), treatment and disposal, combining a number of houses or sources of waste. The waste network might discharge directly to a convenient water course but preferably, if less affordably, the waste will receive some form of treatment, with possible levels including primary (sedimentation), secondary (biological treatment) and most unusually tertiary where there is a demand for immediate re-use. Treatment processes also necessarily include some level of sludge treatment, sludge being the concentration of solid and precipitated parts of the sewage, including the waste from the treatment processes. Networked and/or urban sanitation anticipates a “customer orientation” in the supply of services where cost reflective tariffs are viable.

## STEP 2: SETTING COST RECOVERY & SERVICE OBJECTIVES

### 3.2 Existing policy on user fees and cost recovery targets

35. Water and sanitation services in urban areas, including ‘peri-urban’ (low-income) areas, have the highest potential for achieving a level of financial cost recovery to ensure sustainability.

36. These Guidelines on User Fees suggest a systematic approach to reconciling financial and policy objectives, particularly with regard to cross-subsidization, reflecting also the 2005 Guidelines on Financial Governance which refer to the Bank policy on tariffs. In 1985, the Bank published its policy on tariffs and cost recovery<sup>2</sup>. While many years have passed since its publication, much of the advice and guidance relating to tariffs and cost recovery continues to be relevant. The emphasis is primarily on the sufficiency of revenues to finance operations and debt service. There may be insufficient reference to the need to fund long-term capital maintenance as well as the need to develop means of cost reduction to avoid increasing tariffs and rates.

37. The Bank’s policy on Public Utility Tariffs (1985) suggests a concentration on two aspects: one is controlling costs and making the best use possible of the facilities and manpower; the other is to raise revenues through tariffs. By these means the policy requires that a tariff agreement should, whenever appropriate, be established, preferably in the form of a rate of return covenant, i.e. requiring tariffs that will deliver a positive return on capital employed over and above operations and capital maintenance costs.

38. ‘The formulation of a rate of return covenant should be consistent with appropriate national economic and social objectives by ensuring that : (i) the level and structure of prices for a Public Utility’s services help to maximize the net economic benefits of a project and allocate resources efficiently; (ii) the need to reduce reliance on government support-or the government’s need for resources for development are reflected in formulating the covenant and (iii) the relative income position of the beneficiaries and their ability to pay are taken into account through the tariff structure. The tariff structure must also be designed for load management; i.e. to spread the demand and make the best possible use of existing facilities’.

39. ‘The rate of return on net fixed assets in operation, as revalued from time to time, has the advantage that it is simple and can readily be defined from accounting principles and calculated from standard financial statements. It however presupposes’:

- i) ‘the existence of an efficient accounting system held on an accrual or commercial basis’;

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<sup>2</sup> Source: A Framework For Public Utility Tariff Policy - Electric Power, Telecommunications, Water Supply and Sewerage, African Development Bank, 1985

- ii) 'the revaluation of assets' (*and the avoidance of over-investment in inappropriate assets too early*);
- iii) 'that the rate of return cannot ensure that operations will yield enough cash when needed'. *There is therefore an additional need to note not just the level of accounts receivable but also issues of debt servicing, that is financeability issues;*

40. Public utilities in RMCs are very often required to provide basic services to the urban poor and, less often, to surrounding rural areas where ability to pay may not permit full cost recovery. There might then arise a conflict between the financial and the policy objective. To effect the reconciliation, cross-subsidization within the tariff structure or government subsidies or both could be envisaged. These Guidelines recommend service and price differentiation as a way of meeting both the financial objectives of full cost recovery and the social objectives of providing services to all consumers.

41. 'The Bank has no policy or Guidelines on subsidies and no absolute rule as to sectors or sub-sectors where less-than-full-cost recovery may be acceptable. The Bank has, however, an implicit goal of achieving efficiency. Endorsing cost recovery policies that require the Executing Agency to recover all costs incurred for the project may result in unnecessary or unreasonable charges, especially if the EA is in a monopoly position. There must be an assurance that all costs incurred result from efficient operations and that recovery of unreasonable costs must be avoided.'

42. 'The selection and use of the appropriate mechanisms should be a matter of practical convenience, e.g. using a system that is already in place and which either works or can be made to work with minimum investment; rather than enforcing a principle. In water supply utilities, it is frequently a principle that domestic water consumers should pay for water by measured consumption. However, where all properties have been valued and the data is available to the water utility, then a property-value based water tax can yield the necessary revenues and this may therefore be an acceptable mechanism of setting user fees. A property tax based water charge will however not inhibit consumption. In conditions of constrained supply and high long-run marginal cost, the cost recovery mechanism adopted should contribute materially to the attainment of conservation objectives; in this case by charging on a consumption basis and restraining consumption so that future investments may be deferred. This particular approach requires that (i) metering systems are efficient; (ii) illegal connections are prevented; and (iii) the tariff structure effectively constrains high consumption levels by incremental pricing.'

43. 'Where an activity, such as sewerage operations, has difficulty in achieving full-cost recovery, it should be linked whenever possible with an allied activity or service. In the case of sewerage, its principal activity is wastewater removal, which can be directly related to water consumption. An integrated tariff policy to recover water supply and sewerage costs should be developed which would achieve full cost recovery for both systems.'

44. 'Public utilities sometimes favour providing services to the more affluent sections of a population, partly on the grounds that cost recovery is likely to be more effective, and that delivery to, and servicing of these domestic consumers is generally more simple and cost-effective. However, research into these situations often shows that the poor, ill-serviced population are paying, and will continue to pay, considerably more per litre for their limited

supplies of water, either by bottles, or through tankers or vendors, than the more affluent sections who are already served (albeit insufficiently) or will be provided with water supplies by the proposed project. The equity principle must, therefore, be observed.'

45. 'Social benefit must not be sacrificed for financial expediency. Sound project design should call for an equitable distribution of benefits, including the use of cross-subsidies, where necessary, to provide the largest volume of benefits to the most deprived sectors of the population concerned.'

46. 'Frequently, public sector enterprises provide services to lower income groups at or below the financial or economic cost as part of a National Poverty Reduction Strategy. This raises issues of whether: (i) an enterprise and a sector should be responsible for cross-subsidization; (ii) the government should finance the costs through subsidies either to the enterprise or directly to the beneficiaries; and (iii) the enterprise should be allowed to set lower financial targets which recognize the inability of certain users to meet actual and/or marginal costs. In the latter case, the setting of lower financial targets should not normally be acceptable. If the financial targets are set according to this design their lowering can only risk the future ability of the enterprise to provide a quality of service or product to all consumers.'

47. 'For a public utility to achieve all its goals under the National Development Strategy or the Poverty Reduction Strategy it must have a cash flow that maintains its financial health. The amount of subsidy a government wishes to provide directly or indirectly (e.g., through public enterprises) to low income citizens to enable them to receive goods or services from public enterprises should be recognized in the government's budget and the government should get credit for the true amount of assistance they are providing though implementation of their Poverty Reduction Strategy. A transparent manner to achieve the above goals would be for the government to pay the public enterprise the full amount of the goods or services provided under normal tariff conditions.'<sup>3</sup>

48. The intention of the three AfDB policy documents referred to (Financial Governance and Financial Analysis, Utility Tariff Policy and IWRM) are clear: full financial cost recovery with appropriate protection for the poorest. However, analysis of recent Bank supported projects in water and sanitation suggests that the sustainability objectives of these documents have not been met, perhaps due to inadequacies in managerial and financial performance of utilities as well as the socio-economic conditions in some RMCs. The past acknowledgement that 'the Bank relies on the skill and experience of the Bank staff and experienced consultants to develop appropriate tariffs for revenue-earning agencies' in the context of the many other tasks necessary at appraisal suggests that often a default position has often been taken and that cost recovery through user fees has not been a primary objective.

### 3.3 Setting Cost Recovery and Service Objectives

49. New projects necessarily tend to accept the status quo. That is accepting the RMC's present basis for charging user fees whatever their imperfections, recognising that it requires significant inputs of professional time to facilitate change in tariff structures. Agreements with

<sup>3</sup> Source: Toolkits for Financial Governance and Financial Analysis of Projects, African Development Bank, 2005

RMCs may more often require an overall tariff increase based upon the existing tariff structure, a more achievable objective, though analysis of project appraisals and evaluations suggest this has equally not been given a high priority. The earlier requirement for a loan covenant on utility rate of return has not been apparent in recent agreements with RMCs.

50. This past performance not only indicates the necessity for Guidelines for user fees and cost recovery but also the very significant challenge in achieving financial sustainability. These Guidelines for the urban and networked water and sanitation services therefore incorporate two critical components of cost recovery: the necessity to accept differentiated service standards to ensure costs are minimised to better match potential affordability and a preparedness to accept that some specific user groups may be unable to afford to pay desired user fees even when supported by the maximum possible cross-subsidy within the sub-sector.

51. The Guidelines therefore seek to deliver a workable framework, recognising the economic situation of RMCs, particularly the large and growing number of low-income households, but also the imperative to have a financially viable utility that can deliver services to all income and housing levels with appropriate long-term capital maintenance whilst promoting sustainable water resources.

52. These Guidelines have the added benefit of being able to reflect the cost-saving, efficiency levels delivered in some private sector operations, particularly those driven by incentive based economic regulation. The private sector (and more occasionally the public sector) has also demonstrated pro-poor service delivery strategies, following the willingness to pay to vendors of unserved urban households, but providing a much higher standard of service. Both of these approaches have proved to be useful comparators with which to judge the potential of the majority public sector providers.

53. Attempting to match cost recovery objectives and possibilities with social and economic goals in low-income economies, Table 3.1 provides a framework for dialogue with RMC governments which global experience suggests is both desirable and a reasonable minimum achievable in terms of cost recovery. These targets may be seen to dilute earlier Guidelines but rather the aim is to make them workable such that the best possible outcomes can be achieved for society, going beyond the present 'ad hoc' approach to matching service objectives to possible affordability. It is understood that these minimum cost recovery targets represent an acknowledgement of the timing implications of achieving full cost recovery rather than any compromise in the ultimate objective.

54. The key objective is to promote the highest possible levels of cost recovery through user fees that will ensure the maximum availability of funds within the control of the direct service provider for extension of service coverage and capital maintenance. The Guidelines recognise that it is lack of ongoing maintenance which has led to such poor sustainability of services.

**Table 3.1 Setting charging objectives - minimum cost recovery targets**

	URBAN &/OR NETWORKED WATER	INFORMAL/ PERI-URBAN &/OR NETWORKED WATER	URBAN COMMUNAL WATER, BATHING, SANITATION FACILITIES	URBAN &/OR NETWORKED SANITATION (SEWERAGE & WWT)
Low-income countries	direct provider total opex & capmanex recovery	direct provider total opex recovery	direct provider total opex recovery	direct provider total opex & capmanex recovery
Transitional countries	direct provider total opex & capmanex recovery	direct provider total opex recovery	direct provider total opex recovery	direct provider total opex, capmanex & cost of capital recovery
Lower middle-income countries >\$785 < \$3,115 GNI pc)	direct provider total opex, capmanex & cost of capital recovery	direct provider total opex & capmanex recovery	direct provider total opex & capmanex recovery	direct provider total opex, capmanex & cost of capital recovery
Upper middle-income countries (>\$3,115 <\$9,636)	direct provider total opex, capmanex, cost of capital & support costs recovery	direct provider total opex & capmanex recovery	not applicable	direct provider total opex, capmanex, cost of capital & support costs recovery

Note: opex: operating expenditure;  
 capmanex: capital maintenance expenditure;  
 cost of capital: returns to equity and debt providers;  
 support costs: environmental and economic regulation incl. customer involvement costs, described in more detail in the following section.  
 ‘Direct provider’ refers to the entity, agency, utility or department of municipal government responsible for providing services to customers.

55. The present policy, economic, legislative, and institutional framework is the starting point against which cost recovery goals can be mapped. Where there is a significant disparity between the present environment and the goals of any lending agency there has to be ongoing dialogue at all appropriate levels, political, administrative, service provider and civil society. This will determine whether the implementer wants to adjust its legislation and/or policies according to the goals/advice of and perhaps desires support to do so.

### 3.4 Affordability and willingness to pay user fees

56. One of the reasons for failure in the water sector has been the unwillingness by direct providers to segment customers to a sufficient degree, both within and between countries and then to target levels of services accordingly. This error has been compounded by the presumption that subsidies to all will ensure affordable service to the poor.

57. Within the range of economies noted in Table 3.2, it is therefore possible and necessary to distinguish not only between rich and poor but also between levels of household poverty if

effective and efficient water and sanitation services are to be achieved. Research suggests that it is useful to segment customers, including lower-income, poor households into at least three and most usefully five categories, ranging from the ‘vulnerable non-poor (lower middle-income)’ to the ‘destitute’:

**Table 3.2: Segmenting poor customers**

<b>LOWER MIDDLE-INCOME HOUSEHOLDS</b>	Often employed at low wage levels by government or the formal private sector, living in conventional housing, are susceptible to unexpected financial shocks, particularly ill-health or family expenses. Conventional water and sanitation tariffs are normally affordable but may need to be structured in a way that allows for delay in payments in exceptional circumstances so as not to disrupt household finances and push the family into poverty.
<b>‘DEVELOPING POOR’</b>	Can be characterised as a household in a slum or informal housing area that has sufficient income to be able to invest in permanent (semi-permanent) materials for their own housing, with a fairly regular income from at least one semi-skilled member of the family.
<b>‘COPING POOR’</b>	Describes households with perhaps a single daily employed unskilled earner living in what we could call a temporary shelter (but that might be used for many years), perhaps rented from a slum landlord.
<b>‘VERY POOR’</b>	Might be characterised as a single parent family, very possibly female-headed, child-headed, HIV/AIDS, sharing a one or two room temporary shelter with other families with very irregular or seasonal employment.
<b>‘DESTITUTE’</b>	Refers to the street sleepers and the street children with no fixed living space.

58. In general, subsidies in water and sanitation are absorbed by the higher-income groups rather than the low-income groups described above. Higher-income groups should not normally need to receive any subsidy for conventional services beyond the cost of capital subsidy noted for countries in Africa if service levels and service delivery have been designed appropriately. Revenue from the higher-income customers (note, not necessarily high-income) is critical to ensure the viability of the utility. The use therefore of ‘lifeline blocks’, described in detail below, should be discouraged for the average consumer or at the least proposals must consider very carefully whether any extension of an incremental block tariff system is really beneficial.

59. There is though a real need for support to the poor to enable access to clean water for health and convenience (time saving in collection, privacy for women for example). This support is delivered not only through below service cost user fees, but also through cost reduction in the pattern of supply and differentiated services to meet the special needs of the poor, as a minimum supporting connection costs rather than consumption.

60 For example, the ‘destitute’ and ‘very poor’ may well need to access services, water, bathing and sanitation communally, that is through standposts and public toilets, sanitary blocks and bathing houses. These services still need to be well managed, perhaps through local private or community based operators to deliver an appropriate level of service at the lowest cost, whilst making allowance for the destitute to be able to access at little or no cost.

61. The ‘coping poor’ and the ‘developing poor’, usually in informal slums and shanties can generally afford, and want, to pay for differentiated household connections (low pressure, limited hours, group meters, volumetrically controlled, prepaid meters etc). Because of the lower cost of connection either their connection fees can be reduced (or removed altogether) or some form of ‘lifeline’ block is appropriate. For households that have been used to paying the necessarily high costs for alternative services from, say, vendors, a water tariff that covers full operating and capital maintenance expenditures is normally affordable as long as the payment facilities are accessible for small and frequent payments.

62. The ‘vulnerable non-poor’ are usually able to pay their share of operating and capital maintenance expenses through a conventional connection but expecting payment of the cost of capital as well may be too much, too soon in low-income economies.

63. Networked sanitation, that is sewerage and at least some level of primary treatment to meet IWRM goals, is generally only available in formal housing areas and as such, particularly bearing in mind the level of convenience of ‘flush and forget’, should be chargeable at a higher level of cost recovery without any subsidies. Subsidies in these situations would necessarily be ‘captured’ by higher-income groups, the only ones with access to sewerage.

64. These ideas are explained further in the following sections describing the process of quantifying revenue requirements and determining the basis for charging, that is how user fees are actually determined, taking into account possible cross-subsidies. This process allows for iterations to reconsider objectives if the subsequent levels of user fees prove unacceptable.

65. In cases where a decision on whether or not to subsidize is to be taken, the following should be kept in view:

- a) there are difficulties in identifying and reaching target groups and ensuring that they are the ones who receive the benefit of the subsidy ;
- b) what people of low-income levels, especially in urban areas, gain through cheaper utility services (electricity, water and sewerage and telecommunications) might be lost through rent increases;
- c) subsidization might bias technological choice to more expensive alternatives (which might not be sustainable in the long term);
- d) continuous reliance on government subsidies may have an adverse effect on the management of utilities by removing incentives to hold down costs;
- e) subsidizing has a habit forming effect; once it begins, it is difficult to remove and almost impossible to prevent from spreading.

### **3.5 Setting service objectives**

66. User fees for cost recovery necessarily reflect the cost of delivering a particular level of service. Setting user fees therefore is an iterative process of considering varying service objectives and service levels, calculating cost reflective tariffs then, having taken into account potential efficiency savings, judging those proposed tariffs against indicators of affordability and willingness to pay.

67. Where the tariffs are deemed to be too high, for whatever reason, it is necessary to reconsider the objectives, investigating for example whether there might be over-investment in certain levels of service. It is necessary to look closely at proposed levels of service, subsequent investment needs and potential efficiency gains before considering cross-subsidies.

68. This iterative process necessarily starts from a consideration of existing levels of service, in particular the extent of service coverage, and the resulting costs and revenues. Costs can be benchmarked against the metrics of international comparators or the process benchmarks of other national utilities. A key performance indicator for larger networked urban water supply of *staff per thousand connections* gives a good indication of efficiency. Attention also has to be paid to the process of revenue collection, particularly relating to levels of non revenue water (leakage, illegal collections, standpost water etc) and billing and collection efficiency.

69. Public involvement in the private good of urban water supply is justified by the public health benefits it delivers to the entire urban population as well as the significant reduction in costs of water supply to the poor through a centralised system benefiting from economies of scale. Setting service objectives, and therefore user fees, should focus upon ensuring that health and convenience benefits are achieved by all but particularly by the poor.

70. Existing water service coverage through the piped system, measured as a percentage of population (with particular attention paid to the extent of present service coverage, if any, in the informal housing areas) has to be determined. From this baseline it is possible to propose cost estimates of what a proposed project could deliver. Making this information accessible, as in Table 3.3, immediately illustrates the extent to which the needs of the poor are being served and therefore gives a first indication as to the possible justification and level for any necessary subsidies. Information on the segmentation of lower-income groups as defined above is unlikely to be available immediately. However, it will be required if appropriate user fees related to service objectives are to be established. If not presently available from the direct service provider (utility), then they need to be enabled to access such information. Information on customers and potential customers is key to service delivery. After all (particularly in the long-term), how can any business sell to its customers effectively if it does not know who and where they are and what they want to purchase?

**Table 3.3: Setting service objectives**

	PRESENT	PLANNED/ ANTICIPATED
Service coverage - networked water by population %		
<i>Service coverage - networked water in informal housing areas Recognising particular needs of:</i>		
The 'vulnerable non-poor (lower middle-income)'		
The 'developing poor'		
The 'coping poor'		
The 'very poor'		
The 'destitute'		
Average weekly household payment to water vendors in informal housing areas		
Average household connection fees (and costs)		
Average water user fee relative to average income %		
Average water user fee relative to fourth quartile average income %		
Infant morbidity - diarrhoeal diseases in informal housing areas		
<i>Indicators of institutional efficiency:</i>		
Rate of return on net fixed assets %		
Non revenue water %		
Bill collection efficiency %		
Non user fees revenue %		
Staffing ratio (staff per thousand connections)		
Water resources availability- majority % at distance km (indicating location specific cost of resource, necessarily to be reflected in user fees)		
<i>Networked sanitation indicators:</i>		
Service coverage - networked sewerage by population %		
Service coverage - networked sewerage in informal housing areas %		
Waste water treated- primary level %		
Waste water treated - secondary level %		
Average networked sanitation (sewerage) user fee relative to average water user fee		

71. A simple health indicator such as infant and child diarrhoeal morbidity in informal housing areas, or something similar, gives an indication of the societal need for improved services. Average weekly household payment to water vendors in informal housing areas suggests a level of potential revenue that can be accessed by a cheaper, better quality piped service with the expectation that household payments can be reduced through the formal service.

72. This information, ideally verified by simple customer surveys and focus groups in the lowest-income housing areas, could include some form of willingness to pay survey based upon a menu or 'ladder' of alternative levels of service (service differentiation), at different prices (price differentiation). More sophisticated methodologies are available to investigate willingness to pay such as contingent valuation and conjoint analysis studies. It is wasteful to over-invest in such studies. Efficient water services at cost reflective tariffs are generally affordable by far the majority of customers, present and potential. This is not necessarily true for networked sanitation services (sewerage and wastewater treatment).

73 The results of current service standards (service levels) are best shown to those responsible for making decisions about future service objectives and tariffs in the form of a 'social map', that is a map of the urban area/s with different intensities of colours to illustrate type of housing, access to water and present service reach of the utility. This type of presentation is most useful to challenge any governmental views that 'illegal' housing areas cannot be served. When the extent of the service challenge is communicated effectively, and graphical views are useful in this respect, political views change.

74. Sewerage services are noted in the table though with the expectation that the lower-income areas will need to access sanitation through non-networked on-plot and on-site systems initially. Condominial sewerage may be affordable where treatment costs are not included but this might have significant effects on the environment. This is the reason for requiring information on the proportion of waste water treated at primary sedimentation level, and the amount treated at secondary level as an indicator of potential hazard. There is need to consider employing appropriate technologies, given that technology choice greatly affects costs of provision. For instance, disposal of human faecal waste into on-plot tanks and pits, without the concentration imposed by a sewage collection system, allows for natural processes to digest the waste with only limited groundwater pollution. Such a system attracts considerably lower costs of provision.

75. Where sewerage systems have been used, particularly in higher density commercial and formal areas of cities, the resulting collection and waste water treatment costs are at least as much as the costs of networked water supply if not more (depending upon the level of treatment). Particular attention has to be paid to the subsidies given to sewerage, in many countries not unusually being charged at the rate of just 20% to 30% of the water costs. It is normally only the middle to higher-income groups who can access sewerage services, and therefore those subsidies. Therefore a first estimate of the cost of sewerage being 100% to 120% of the cost of water supply should be investigated. The convenience of this level of service is likely to be desired and affordable by the commercial and high-income premises with water connections without the present level of subsidies.

76. Detailing the availability of water resources in the form of the percentage accessed from different sources, with a rough approximation of the distance from the city, gives an indication of the likely costs of water and again justifies or explains the necessity for subsidies. However the approach used in some countries of giving additional budgetary support or subsidies to towns located at a greater distance from a water source might have the perverse effect of encouraging additional water consumption in an inappropriate location that is not sustainable. Subsidising high water-using industries or functions in dry areas is not effective in the long

term. All these issues have to be taken into account in setting service and tariff objectives and determining the means of achieving those objectives.

77. Within the context of setting objectives relative to user fees, it is equally necessary to understand the existing financial situation of the direct service provider. Conventional financial analysis, as required for any project appraisal, has to be used to determine the potential to reach cost reflectivity within a reasonable time. If, for example, there is an expectation of significant investment to improve services but present tariffs are well below costs then improving services too quickly may compound the challenge to achieve cost reflective tariffs, having to 'catch up' from the past weak situation as well as paying for the new services.

78. One significant influence on tariff levels is the extent of 'non-revenue water'. If, as a simplistic example, the level of non-revenue water is 50% then the tariff charged for water produced and delivered through the distribution system necessarily has to be double the production cost in volumetric terms. Non-revenue water includes physical leakage as well as commercial losses (due to illegal connections, water sold through legal connections but not paid for, and the water distributed free through stand-posts).

79. Where water availability is high and treatment and pumping costs are relatively low, then a higher level of non-revenue water (up to say 20%) may be acceptable. The concept of the 'economic level of leakage' reflects the idea that it is not worthwhile to over-invest in renewing mains to limit leakage where that investment is higher than the cost of the water being saved. However, with a number of utilities reporting non-revenue water greater than 65%, there is a considerable opportunity to reduce leakage, and hence potentially require a smaller uplift in tariffs, before that economic level of leakage is reached. **A priority objective might well be to reduce leakage before considering additional treatment capacity for example.** Utilities have found that the resulting surplus capacity is a cost effective "source" of water which can be used to supply service extensions in low-income areas.

80. The overall financial situation of the utility can be most easily noted from the return on net fixed assets, having ensured that the valuation of those assets is up to date, at 'current' levels. Normally, water utilities are expected, or are expecting, to achieve a 'real' return of about 4-5% with an upper limit of around 8% for this relatively risk free monopoly business delivering a basic needs service. **Knowledge of the existing rate of return is critical in setting overall objectives relative to the likely increase to achieve cost reflective tariffs.**

81. Under the accrual system of accounting, the rate of return calculation records revenue as earned when the service is delivered, not when payment is received. An acceptable rate of return therefore has to be considered relative to the level of debts or accounts receivable to ensure that tariffs are actually being recovered. This figure is generally referred to as the bill collection efficiency, which relates to the extent of bad debts written off, generally after three or four years of non-payment, and only subsequent to significant efforts to collect those debts. **Levels of bill collection efficiency below 90% are a warning that either the billing and revenue collection process is failing or that the tariffs are perceived to be unaffordable or unacceptable relative to the service level.**

82. A final check on the existing financial situation in the context of setting objectives is to consider the average tariff paid by a household on average income, and the average tariff

which would be paid by households on one half of average income, that is at the 25% level. This latter figure should be contrasted with what such households are paying for vended water at present, with the expectation that efficient piped supply will be cheaper than present costs of vended water. The 'rule of thumb' used in the industry is of water and sanitation costs not exceeding 5% of household income. This is however only an indicator for comparison of user fees between different countries.

83. Whatever figure is chosen for comparison purposes, the costs of meeting the service objectives should ideally be less than this 5% "affordability" level for by far the majority of households. For the 10%-20% who would end up paying more than 5%, there needs to be careful consideration of a) the potential for 'pricing and service differentiation' to reduce the cost of serving the poorest, b) the value of cross-subsidies (and what effect that might have on the tariff of average income level households) and c) the use of welfare payments to those poorest households or possibly a combination of all three approaches.

### 3.6 Identifying present and potential services desired

84. Having determined the objectives and possible extent of overall cost recovery in the sub-sectors and between differing customer segments, the next step is to define what services or outputs are desired, that is desired by individual consumers as well as by communities and society as a whole. The former refers to the location and number of hours of water supplied through a tap per day for example, the latter can be referring to environmental conditions such as waste water disposal.

85. Desired levels of service (or standards) may be unaffordable, making cost recovery impossible. The extent to which the levels of service (or standards of services) are deemed to be discretionary can be adjusted to match affordability. Equally the apparent costs might be higher than necessary and can be reduced through efficiency savings in provision where there are sufficient drivers to do so. **It should be noted that the choice of technology is a significant factor in determining the costs of service provision.**

86. Frequently the actual cost of service provision is poorly defined - either because the records of operating agencies are not organised so as to allow separation of costs on the basis of activities relating to service provision for specific sectors or users, and/or because the actual expenditures are not properly related to costs of service provision.

87. Service providers should have appropriate accounting systems to facilitate understanding of the costs of service provision, before designing and implementing a credible cost recovery system. For capital intensive networked water and sanitation services, the direct provider has to be using a form of conventional accrual accounting (also referred to as fixed asset accounting) if the costs are to be known and recovered.

## STEP 3: DETERMINING REVENUE REQUIREMENTS

### 3.7 Understanding total revenue requirements

88. The guidance earlier has already indicated the major elements to be included in determining overall average tariffs, before beginning to consider how these average tariffs might be shared out amongst different categories of customers, described under the ‘Basis for Charging’ in section Four (4).

89. The first cost element usually considered<sup>4</sup> is the **capital cost**, the amount invested in constructing fixed assets such as hydraulic structures, electro-mechanical equipment such as pumps and motors, and the pipes which are necessary before anything else can be achieved. Networked water and sewerage has a particularly high dependence upon fixed assets, sometimes described as ‘capital intensity’, that is the ratio of revenues to fixed assets (at current costs). Investments in fixed assets are necessarily occasional and therefore ‘lumpy’ and are therefore best addressed through conventional ‘accrual’ or fixed asset accounting procedures which are a method of distributing these costs fairly (so as not to disadvantage any particular consumer group) over the lifetime of the assets.

**Table 3.4: Defining components of capital investments**

<b>Capital investments in fixed assets (Capex)</b>	<b>Water supply specific:</b> Water resources and water treatment facilities; water transmission and distribution mains; <b>Sanitation specific:</b> Wastewater collection systems (sewers), wastewater treatment and disposal systems, sludge management and treatment equipment; <b>Water supply and sanitation:</b> Offices, IT systems, vehicles for maintenance; workshops/depots and warehouses; land for protecting water quality; etc
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90. Capital investment in fixed assets usually has to be sourced, that is financed externally to the direct provider, resulting in costs to be reimbursed to the provider(s) of finance. A relatively efficient direct provider, serving a large number of customers in an urban area, is able to support repayments of the principal amount of loans for capital investment through efficient cash management, not directly as part of user fees. However the cost of that capital is the interest rate required to be paid to the provider of the loan which is to be included in the determination of user fees.

91. Actual delivery of services to users and consumers depends upon operating these fixed assets, that is employing staff to run the systems; providing power to run the pumps and

<sup>4</sup> For further information, the ‘WASHCost’ project is focused on exploring and sharing an understanding of the true costs of sustainable rural and peri-urban water and sanitation services: [www.washcost.info](http://www.washcost.info)

motors; procuring chemicals for use in treating water at the treatment works; etc. The total costs for a water and sanitation utility can thus be usefully broken down into the Cost of Capital (to service the capital financing, usually interest on loans though it can include dividend payments to private equity providers, particularly in the case of small scale independent providers), **Capital Maintenance Charges/Expenditure** ('CapManex', to ensure the resulting fixed assets remain serviceable) and **Operating and Minor Maintenance Expenditure** (sometimes described as 'Opex'). This breakdown of costs is normally listed in reverse order to fit standard accounting procedures.

**Table 3.5: Breakdown of costs for a water and sanitation utility**

<b>Operating &amp; minor maintenance expenditures (Opex)</b>	Expenditure on labour, power, fuel, chemicals, materials, vehicles, billing and collection, information and communications service; Overheads, direct institutional support structures; Bulk water purchases; Direct support costs: abstraction licenses, regulatory licenses, customer involvement costs.
<b>Capital maintenance charges/ expenditures (CapManex)</b>	Charges/expenditure on infrastructure renewals (depreciation): asset renewal, rehabilitation and replacement costs based upon serviceability and risk criteria, within the context of asset management planning; accounting rules may guide or govern what is included under capital maintenance and the extent to which broad equivalence is achieved between charges for depreciation and expenditure on capital maintenance.
<b>Costs of capital (debt and equity)</b>	Returns to providers of equity and debt, that is dividends for owners' equity (retained earnings where not distributed - relevant for small scale independent providers) and interest for loans, with appropriate provision for bank fees and financeability (to ensure cash flow for debt servicing) as well as recognition of any exchange rate risks on external sourcing of finance;

92. The key to ensuring adequate revenues for sustainability of urban networked services is to begin the process of moving towards "cost reflective tariffs". No accounting system can predict future costs, and therefore revenue needs, totally accurately. There are uncertainties in power costs for example and the necessity for and the timing of infrastructure renewals (pump or pipe replacements for example). This indicates that although the ideal would be for total revenues to equal total costs there is necessarily always some mismatch. Hence the term, cost-reflective, which indicates the aim to match total user fees, and therefore revenues, to costs as closely as possible whilst recognising that it cannot be exact. Ideally the user fees are also matched to the structure of those costs, acknowledging that some costs are relatively fixed whilst others vary according to the output.

93. Operating costs are often referred to as Operation and Maintenance Costs (O&M) and for many water providers the initial goal is to achieve tariffs that will cover those O&M costs. This might be a significant first step for under-performing utilities, and particularly significant for

politicians who have to 'sell' the resulting tariff increase, but this limited approach automatically builds in subsidies (or failure to provide) for the Capital Maintenance Costs and the Costs of Capital. For the majority of (higher-income) consumers these subsidies cannot be justified, particularly as the result is normally a shortfall in the ability to maintain serviceability of fixed assets.

94. Operations and Maintenance Costs should be more properly described as 'Operations and Minor Maintenance' (O&MM). Operations and minor maintenance costs would normally include, for example, the costs of employing staff (for billing and collection as well as water production and distribution), electricity costs for pumping, fuel for vehicles, chemicals for the treatment process including chlorine or other appropriate disinfection, specialised labour and materials for minor maintenance, information and communications services, that is computers, telemetry and telephone systems for communicating with customers. There will also be costs, perhaps defined as overheads or direct institutional support structures, for head office activities such as planning and managing operations. In some situations there may be payments for the purchase of bulk water from another supplier or from an irrigation provider.

95. It is now recognised that there are also 'direct support costs' to be paid for which include abstraction licenses to support catchment management activities paid to water resources/ environmental management agencies, licence payments to economic regulatory agencies and support fees to Consumer/Customer/Community involvement mechanisms (which may include training for household members and committee members). In conventional accounting systems for utilities these direct support costs are recognised as part of operating costs. Some cost recovery approaches recognise the different quality of these costs and, as a form of subsidy, anticipate direct support costs as well as indirect support costs to be paid by government.

96. The 'indirect financial support costs' of government macro-level planning and policy-making, developing and maintaining frameworks and institutional arrangements, capacity-building for professionals and technicians in pre-employment conventional education are part of the costs of supplying water but are not included in user fees. Similarly the economic costs, the externalities or opportunity costs of resource use, are not generally recovered through user fees although Integrated Water Resources Management approaches requires at least an assurance that water resources are not being mined or unduly polluted. Some countries now require additional payments for abstraction from groundwater to limit over-abstraction, recognising the economic value of that resource. Recognising the opportunity costs of water resources in high value, relatively low volume urban use - that is the value of those sources in the next best alternative - is normally not an issue when the alternative is low value, high volume water use in irrigation.

97. Capital Maintenance expenditure, also described as '**infrastructure renewal costs**' and '**rehabilitation**' costs, represents the critical spending to ensure that services continue in the long term. There is a difficulty in networked water supply and sewerage in that once some elements of the system have been built, they are able to function for a substantial period without any apparent failure in service and therefore apparently not requiring any renewal or capital maintenance. However, once a difficult to determine level has been reached, failure to invest in capital maintenance leads to a steady degradation in service quality. Where customers have not been paying for their fair share of these capital maintenance costs on a regular basis the result is that systems tend, over time, towards producing ever poorer quality water ever

more intermittently (with the poorest always at the end of the line to receive service), with eventually a very high additional cost to finance rehabilitation.

98. This process, referred to by economists as ‘inter-generational’ transfer (as it is the following generation of consumers who would have to pay for that rehabilitation), is apparent in most infrastructure provision in many lower-income economies, just as it also is in some high-income countries. The usual effect in water and sanitation is worsening public health indicators and increased costs in self-provision (‘coping costs’), a burden which is particularly difficult for the poorest. The OECD refers to the ‘Three ‘T’s of paying for water, i.e. **tariffs, taxes and transfers**. In many systems it appears that there is a fourth ‘T’ that is timing, referring to the postponement of necessary payments to succeeding generations.

99. These Guidelines, recognising the difficulty of full cost recovery in low-income economies, nevertheless require calculations of user fees to concentrate on achieving a reasonable level of recovery of the desired capital maintenance expenditure (in addition to operation and minor maintenance costs). This is to ensure the ability of the direct service provider to be able to undertake the necessary maintenance works in a timely manner. Waiting on government for budgetary allowances (taxes or transfers) to pay for capital maintenance has failed in nearly all economies. Recovery of capital maintenance costs also signals to customers a better approximation of the cost of water and therefore the value, such that demand can be adjusted accordingly.

100. The mechanism by which capital maintenance expenditure is recovered is known in accounting terms as ‘**depreciation**’. For a conventional business this is the measure of the using-up of the value of the fixed assets needed to produce products for sale such that a real level of profitability can be understood. With changing technologies and products those assets might never be directly replaced. However, in the networked water and sewerage industries, particularly the underground assets of pipes, it can be assumed that those assets will always be needed. Therefore the depreciation charge, over the long-term, represents the best estimate of the costs, the ‘broad equivalence’, of keeping those assets in an ongoing good, serviceable condition.

101. Traditionally depreciation is charged based upon dividing the cost of the asset by the assumed life of that asset. Asset Management Planning is now the standard and expected tool to refine that process such that the real costs of long-term asset maintenance for serviceability are charged for. AfDB expects to support utilities in setting up appropriate asset management plans as part of the move towards cost recovery. Whilst such systems are put in place the conventional approach of providing for depreciation of capital maintenance should be followed. This should be based on the current costs of fixed assets, updated to take account of inflation, not the original historical costs.

102. The third component of user tariffs is the cost of capital which is the cost of accessing the finance that has paid for the capital investments through which water is treated and distributed, collected and treated again. The finance has to be paid for, “serviced”, either through interest payments on the debt element or through dividend returns to the owners, i.e. the providers of the equity capital.

103. Where governments have provided the equity through budgetary grants they may not require any “dividend” or “financing” payments. In this case, the result is another form of subsidy. Such capital contribution from government is a scarce resource which could have been used in alternative investments perhaps to greater public benefit (the ‘opportunity cost of capital’). Governments are increasingly moving towards accrual accounting for their own operations as well as for their public utilities, a process which is likely to lead to greater transparency in capital allocation and subsidies. The level of dividends deferred, and therefore the extent of ongoing government support will become more transparent as a result, and this will assist in better understanding of the value of water.

104. Where utilities (or their government owners) have taken out loans to invest in water and sewerage assets there will normally be interest payments to recompense the providers of the debt. The two returns on capital, that is any dividends required and interest payments, are together referred to as the weighted average cost of capital (WACC), weighted according to the relative levels of debt and equity. *For further information on WACC please refer to Toolkits for Financial Governance and Financial Analysis of Projects, AfDB, 2005.*

105. In Table 3.1, these Guidelines indicate that there are a number of situations where government provision of the cost of capital is an efficient direct subsidy to the utility, and therefore its customers, without affecting the performance level of the utility. However the cost of capital would best be included in all tariff calculations so that the level of subsidy is transparent to users and civil society.

106. This explanation of quantifying revenue requirements makes no mention of **amortization**, i.e. paying back the capital principal of debt or loans. Repaying borrowed capital is a component of financeability rather than revenue requirement. There should be sufficient cash flow from operations to pay for depreciation or capital maintenance (not necessarily directly comparable to depreciation charges in any particular year) and to meet debt repayment requirements. Where these numbers do not balance conveniently, issues of financeability or cash flow have to be addressed in addition to the three main components of revenue requirements. Where necessary use is made of accelerated depreciation or the weighted average cost of capital is increased to ensure financeability.

107. In all these assessments of costs, because of the capital intensity of networked water and sewerage operations and the long-life of those assets, it is necessary to use “current cost” accounting approaches to ensure that all assets are valued (and charged for) at present day, current costs. It is noted that there is a particular challenge where capital assets are financed in foreign currency.

### **3.8 How are average user fees to be calculated?**

108. The discussion above relates to accounting costs which are by nature ‘historical’, i.e. recording costs that have already been incurred. It is of course possible and normal to project these costs into the future to ensure adequate cost recovery, taking into account future needs.

109. The projection will be able to indicate a reasonable rate of ‘catch-up’ from the existing tariffs to what is needed in order to be reasonably cost reflective. It is usually not possible or

desirable to expect customers to bridge the gap between the existing levels of user fees and cost reflective fees in one adjustment. Depending upon the size of the gap it might well be appropriate to plan for a five year transition.

110. It is now normal practice to make these projections using present day costs with the understanding or rather the requirement that tariffs will be increased by the level of inflation each year, before taking account of any possible savings from efficiency or increases from improvements to the service. **Indexation of tariffs, maintaining the value of the user fees over time, is critical for long-term sustainability of capital intensive networked services.** There may on occasion be a mismatch between the retail price inflation index, however calculated, and the construction price index (if calculated at all) which better represents the change in costs over time to the utility. However, this discrepancy is usually minimal relative to the normal practice of not indexing tariffs at all.

111. Customers become used to the idea that water user fees, where the service is good enough, need to increase to match inflation. The principle to follow regarding increases is 'little and often'. Normal and understandable customer resistance to price rises is increased by an order of magnitude if the utility or government waits several years before imposing inflation 'catch-up' increases, in addition to catch-up increases where tariffs have long failed to be cost-reflective. Where automatic indexation is not undertaken then revenue always falls behind costs with the result firstly that capital maintenance is deferred, leading to poorer quality, secondly minor maintenance is deferred leading to increased leakage and thirdly power costs are not affordable such that intermittent supply becomes the norm. Unless government and its utility are committed to tariff indexation, having taken into account the subsidies described in Table 3.1 above and section 3.10 below, there is little real value in temporarily adjusting user fees and tariffs as part of a one-off project.

112. Having determined total revenue requirements for water and sanitation services, specific user charges can be calculated according to the "Basis for charging" in Step 4. Some regulatory systems have found it helpful to summarise the necessary elements of an annual tariff increase as 'RPI' + 'K', measured as a percentage increase on the existing user fees. 'RPI' or its equivalent is the inflation measure by means of a Retail Price Index, independent of any water activities, whilst the 'K' factor describes those elements under the control of the direct provider. In the context of AfDB lending, 'K' can be defined as being equal to the sum of +Pc, representing a 'catch-up' factor, -X, a negative value representing an estimation of future Efficiency gains by the utility, +C to pay for extending Coverage, particularly to the poor, +Q for Environmental Quality Enhancement, Water supply and/or waste water, +V for Security of Supply (representing enhanced storage & leakage reduction), +S for improvements to customer Service levels.

$$\text{Future Revenue Requirement} = \text{Existing Revenue} \times (1 + (RPI + K))$$

Where  $K = Pc - X + C + Q + V + S$  all as percentages.

113. The purpose of this formula is to assist utility managers, regulators and government officials as they explain the reason for tariff changes. Unless customers and their representatives, politicians and civil society, can decipher, understand and argue about the

components of tariff increases in a transparent manner there is likely to be little acceptance of the need for the increases and even less willingness to pay those increases.

114. In this context governments are finding it useful to have a semi-autonomous body to determine fair and reasonable tariffs. Economic regulators have generally been introduced in the context of private sector participation in the water sector, where a monopolistic service provider might have an incentive to raise prices higher than costs. It is not clear that this has actually happened anywhere in Africa. Service providers have to some extent been self-regulated, to ensure that they can maintain support for their business.

115. There are however signs that many service providers have not become as efficient as they could over time. This is even more true of public providers who, even though 'owned by society' through government for the public good, have usually operated in such a way as to maximise their own, 'producer' interests, rather than the interests of customers. For these reasons incentive-based economic regulation has proved to be a powerful tool where utilities are empowered to be able to respond to those incentives. Even without the incentives, an independent 'referee' to ensure some level of transparency in costs, subsidies and charges is valuable so long as the costs of regulation are controlled. At a minimum level, economic regulation can comprise an economist or finance professional engaged for a few days a month or during the particular period of re-setting user fees. The process does not necessarily require a separate government entity, though that is appropriate when a regulator is tasked with overseeing levels or standards of service in a whole country.

116. One of the key tasks of a regulator, and in the absence of a regulator it remains the duty of utility senior management, is continually to seek to reduce costs, ensuring ongoing efficiency gains. This may be difficult in a situation where there are no incentives to reward efficiency and where there may be a tendency by government as owner to require ever more staff to be employed. However, users can only be expected to pay cost-reflective charges when those costs are reasonably fair and efficient. Therefore all possible approaches have to be considered to reduce costs - including reappraising objectives and quality standards, differentiating service standards (particularly to ensure services to the poor reducing staffing (all as discussed above), benchmarking metrics and processes so as to optimise plant usage, improving billing techniques for example, and advanced procurement policies and capital cost benchmarking with asset management planning for serviceability and capital maintenance so as to minimise investment costs. One key aspect of cost minimisation is to contract-out specific services such as letting a contract to a private sector company to operate a treatment works, or to read meters and send out bills or even to a single technician to operate a pumping station. Research has shown that these small contracts can be very effective and, when introduced in the context of an expanding utility - where there is less of a threat to existing staff - they can be introduced without significant upset.

117. Overall the most effective driver for efficiency, where monetary rewards are not appropriate, is through some form of comparative competition. Comparing the performance of one utility or section of a utility with another, and bringing out strengths and weaknesses in each often acts as a powerful driver for improvement amongst professionals and good staff who want to demonstrate that they are equally competent. Use of the International Benchmarking Network for Water and Sanitation Utilities ([www.ib-net.org](http://www.ib-net.org)) is recommended. This generation of comparative competition, performance league tables for example, is another major role for

an economic regulator or government department undertaking part of the role of a regulator. Some governments have an Efficiency Monitoring Unit whose mandate is to monitor the performance of government owned companies. Such a unit can perform the function of a regulator.

118. Determining cost-reflective user fees is an ongoing process that should not be dependent upon any particular project that is seeking funding. In addition to regular indexation of charges, there should be a mechanism for periodic reviews of the overall basis for charging, capturing the benefits for customers of increasing efficiency as well as sharing the costs of increasing quality improvements. Some systems require annual consideration of user fees whilst others review after two to five years. In lower-income countries it is recommended that reviews should be carried out relatively frequently.

### 3.9 Future costs for sustainability

119. There is an additional approach to ensuring sustainable cost recovery which focuses upon the future costs of supply. It is in the nature of water supply that each new source to meet increased demand tends to be further and further away, and often lower or deeper, requiring additional storage and pumping or increased treatment. Costs of future water consumed are therefore nearly always higher than present costs. There is an argument therefore that some (large) users should pay more at present to signal to them the likely additional costs of delivering those levels of service in the future if they continue to access water resources at a similar rate as total water demand rises. These “**long run marginal costs**” are nearly always higher than “average historical costs” in the water supply industry and therefore generate surplus revenue in the short term.

120. Long run marginal costs are best estimated through a process known as average incremental costing whereby the capital costs and the operating costs of the next major source(s) of water (including the necessary additional treatment & transmission costs, etc) are calculated in “present value terms”. “**Present Value**” refers to the process of “discounting” future expenditures to the amount needed now (the present) by the “opportunity cost of capital”. The opportunity cost of capital represents the cost to society of government using capital in this investment rather than the next best alternative. This process of discounting determines the total amount that would be needed now, the present costs, such that if that amount was invested and received interest (at the same level as the opportunity cost of capital), it would be sufficient to pay all the costs (in the foreseeable or calculable future, generally twenty years or so) for the exploitation of the next possible sources of water. These Present Costs are divided by the Present Value (the discounted stream of revenues, determined by multiplying the future quantities of water to be sold from the new source by the average tariff, initially unknown) to determine the average incremental cost in currency units per cubic metre.

121. The possible role of long run marginal costs within a tariff structure is described in Step 4.

### 3.10 Support to revenue through societal contributions

122. Subsidies play an important role in ensuring adequate income for effective operation of utilities in lower-income economies. Particularly for the lowest-income urban communities, smaller secondary towns and rural areas, subsidies are often a necessary element of ensuring sustainability until economic growth is sufficient to enable greater dependence upon local resources.

123. The challenge of providing subsidies is that they are often poorly targeted, are captured by groups other than the poorest, and continue for longer than the initial need required. In this manner they then lead to dependency, ineffective use of resources, misleading tariffs, overall utility inefficiency and this does nothing to assist the poorest.

124. Within the context of ensuring overall revenue adequacy therefore, subsidies should be clearly specified, targeted and limited, either by time or by an acceptable indicator of the likelihood of fully cost-reflective tariffs. Subsidies should also be transparent, ideally with each bill communicating the extent to which actual water and sanitation costs are being subsidised. The reason for this is that subsidies have the un-intentioned effect of “confusing” customers as to the true cost, and therefore value, of water.

125. Subsidies, particularly subsidies for capital investment, also confuse government and utility managers as to the true cost of maintaining capital intensive infrastructure, usually leading to a gradual run down in quality of services.

126. Where subsidies are contributions towards operating and capital maintenance expenditures, some estimate should be made as to the likelihood, as well as the desirability, of their long-term continuance. The key to customer acceptance of tariff changes is predictability based upon small and regular increases.

127. Subsidies which might be utilised to meet total revenue requirements include:

- International contributions (transfers) to the cost of capital (reduced or zero cost of capital through grants or low interest loans for capital investment)
- International contributions (transfers) through National PRSPs to Budgetary Support, potentially to capital maintenance expenditure and the cost of capital
- National contributions from taxes to capital maintenance expenditure and the cost of capital
- Metropolitan urban contributions (cross-subsidies) from revenue to capital maintenance expenditure and the cost of capital in secondary towns.

128. This latter point raises the question as to what extent user fees for networked water and sanitation services should be uniform across the country or specific to the particular location and its particular cost structure. There has to be consideration as to the size of the country, the variation in hydrological and economic characteristics, as well as existing policy. Best practice is to follow cost-reflective principles, which implies local variations, whilst limiting the number of different tariff structures, which leads to regional tariffs. One goal, particularly

relevant to IWRM, is not to subsidise water supply unduly, particularly for large users such as industries, in areas where water resources are not sustainable in the long-term.

129. Overall, subsidies, particularly international subsidies (transfers), are a useful mechanism to pay the non-recovered utility costs for a clearly prescribed 'catch-up' period, during the change from existing below-cost tariffs to cost-reflective tariffs for higher-income customers.

130. Cross-subsidies from one segment of customers to another within a utility's operational boundary do not affect the overall revenue. The role of cross-subsidies is described in Step 4.

## STEP 4: THE BASIS FOR CHARGING USER FEES

### 3.11 The basis for charging domestic networked water & sewerage user fees

131. The determination of total revenue requirements, and an understanding of long run marginal costs, is the starting point for determining the actual user fees (tariffs) that customers should pay for financially sustainable services.

132. There are then four main approaches to computing domestic user fees:

- fixed volumetric fee based upon the measured amount of water taken;
- variable volumetric fee based upon the measured amount of water taken;
- fixed fee based upon some housing, household or pipe characteristic; and
- variable fee based upon some housing, household or pipe characteristic.

Many tariff systems use different combinations of these four approaches. As described earlier, these Guidelines anticipate only limited changes to the basis for charging in any RMC in the short-term. The first priority is to ensure an adequate overall adjustment/increase in existing user fee structures to achieve the desired movement towards cost recovery. Subsequent to that, the guidance is to work with RMCs to simplify the basis for charging wherever possible.

133. To implement this guidance with RMCs it is necessary to understand the various ideas and limitations of charging approaches.

134. At its simplest, it is possible to take the total revenue requirement as computed in Step 3, divide by the volume of water sold and, with a small allowance for bill collection inefficiency, take the resulting amount per cubic metre as the volumetric tariff to be charged. Note that the calculation is based upon the amount of water sold, not produced as it is necessary to recover the revenues foregone through “non revenue water” (leakage, water obtained without charge at kiosks/standposts and illegal connections).

135. However, this presupposes that all consumers have accurate, working meters. It assumes that this cost of metering (and meter reading and billing), perhaps upwards of an additional quarter on the cost of water supply, is affordable and worth paying. Where water supplies are intermittent with water available for only a few hours per day, the value of metering may be even more diminished. When customers have to leave taps fully open to fill home tanks and containers for the two hours per day when water is pumped then it may not be best use of resources to meter that supply and to read those meters and bill accordingly. The average water taken can be easily estimated to appropriate levels of accuracy, where daily pumping hours are relatively constant, and fixed charges levied accordingly. Despite the cost of metering, experience shows that customers are more willing to pay for water bills that are based on metered consumption rather than on flat rates.

136. It is possible to take another simple approach and noting that the costs of water supply are predominantly fixed (due to the capital intensity of networked water with only a small variable amount for chemicals and pumping) then cost reflective tariffs could be equally predominantly fixed. The tariff would then be determined by dividing the revenue requirement by the number of households. This could be modified by varying the tariff for household size or in some situations by some measure of household wealth. Another variation is to vary the fixed charge according to the connection pipe size. The fixed charge approach for domestic customers assumes that large commercial and industrial users pay by metered volumetric use, ideally paying at the Long Run Marginal cost and pre-supposing there is no over-abstraction of available water resources. In many RMCs, accurate customer information is lacking, and this makes it difficult to bill customers based on, for example, household size or household wealth.

137. Both of the above bases for charging, volumetric or flat rate/fixed are equally valid and are used in various combinations by utilities around the world to ensure adequate levels of revenue. These Guidelines recommend that, wherever reasonable, volumetric user fees should be encouraged as although volumetric charging adds to the costs it enhances customers' willingness to pay in respect of receiving known amounts of water. Overall the aim is that user fees should be adequate, fair, conserving the resource and enforceable.

<b>KEY PRINCIPLES OF DIFFERENTIATED USER FEES AND CHARGES</b>	<b>User fees (charges) should incorporate the needs for:</b>	
	<b>Revenue Adequacy</b>	For operations and minor maintenance, for capital maintenance, for cost of capital employed
	<b>Social Fairness</b>	In setting prices between different customer types/groups, particularly recognising needs of 'vulnerable non-poor (lower middle-income)', the 'developing poor', the 'coping poor' the 'very poor and the 'destitute'
	<b>Conserving the water</b>	Environment - demand management of water resources and waste water treatment and return charges based upon 'polluter pays' principles
	<b>Simplicity and Enforceability</b>	Overly complex tariffs fail to send appropriate signals to customers

138. However, user fees are required not only to ensure revenue adequacy but also to reflect social issues such as service to the poor as well as to reflect environmental issues related to economic values of water. It is at this stage that the basis for charging becomes more complex with most utilities using some combination of fixed and variable tariffs and some utilities using ever more complex variations between groups of customers to meet these three, sometimes conflicting requirements for charging: revenue adequacy, affordable service to the poor and water demand management.

139. The "meeting all requirements approach" is generally attempted through some form of "block tariffs" system whereby users who consume different amounts per period of time (usually per month but also bi-monthly, quarterly etc) pay a different amount for each cubic metre consumed within any particular consumption band.

140. The initial, cost reflective, approach to block tariffs recognises that users who consume more, for example industry and bottling plants using bulk water through 150mm mains, impose a lower cost per cubic metre consumed than small households requiring costly small diameter connections. It is not reasonable or manageable to have continually varying tariffs to match the continually varying costs imposed by different types of user and therefore a number of blocks or steps in the unit charge are used to simplify the reflection of those costs. For larger users, cost reflectivity might therefore appear to require a “**decreasing block tariff**” whereby the charge per unit consumed decreases as the amount increases. On other criteria however this approach is seen as unfair on the poorest who consume least. Society requires that poor, low users can afford to ensure individual and public health needs of water and sanitation and therefore a “**lifeline block**” is introduced. This low tariff amount of water is deemed to be sufficient to meet the basic needs for water and can be delivered for what is deemed to be an affordable tariff, irrespective of cost. In some countries that tariff is zero on the premise that there is a human right to water for life, water being utterly necessary for health and survival.

141. There is then considerable uncertainty as to what amount of water per month might fairly constitute a reasonable “**lifeline**” amount of water. If it is too small then large families (who are often the poorest) and multiple households sharing one connection cannot access the amount of water they need without moving into the higher tariff bracket. However, if it is too large then the majority of all households will be able to access their water needs within the amount allowed for the subsidised “lifeline” tariff.

### 3.12 The basis for charging non-domestic networked water & sewerage user fees

142. Even though it may be cheaper to supply them, large users may be imposing an unfair burden on the supply system (and the water resources environment) by assuming that they can take ever more quantities of water at the given charge. The integrated water resources management approach requires that tariffs include a “signal” relating to the increased costs, financial, economic and environmental, of demanding ever greater amounts of water. As described earlier, it is in the nature of water supply that each new source to meet increased demand tends to be further away, deeper, requiring additional storage or increased treatment etc. Costs of future water consumed are therefore nearly always higher than present costs. The argument is that large users should therefore pay more at present, at a higher tariff block, to indicate the likely additional costs of extending the service in the future.

143. An alternative (or additional) approach to the challenge of large users is to introduce ‘seasonal tariffs’. Again, because most costs of water supply are fixed it is unreasonable to size (and pay for) plant and equipment and pipe networks to meet demand in only a small fraction of the year. Why should the average consumer have to pay for the peak demands of the few during a limited peak season? Therefore seasonal charges are used in some systems with higher charges for large users during, for example, the hottest three months of the year. Utilities also address this issue through the use of ‘interruptible tariffs’ whereby large users can choose to pay a lower average tariff but the utility can cut their supply (with due notice) at times of peak demand on the system.

144. The approach in some countries has been to take this latter point as a reason to increase charges on large users to such an extent that they not only pay the long run marginal cost but also they are in effect subsidising all domestic consumers (not just the poor). This then becomes a tax on industry and commerce which may hinder economic development and employment. In the context of many RMCs, this approach is not recommended, because it has the potential to make RMCs uncompetitive.

145. Attempts to match the conflicting aims of charging policy has led some utilities to develop multiple 'increasing (rising) block tariff' systems with different quantities and prices for each of differing connection sizes and/or household and user group types. The end result is that no one understands the system, customers cannot respond rationally to the pricing signals and the utility cannot predict the revenue which might result from any changes in overall or individual pricing levels.

146. Economists use the concept of "price elasticity" to determine and predict the amount by which revenue changes as a result of price changes. The price elasticity of demand is defined as the percentage change in consumption which follows from a percentage change in price. In practice this means that the smaller the amount of water used (such low users generally being the poorest) the lowest elasticity of demand resulting. The poorest cannot reduce their demand any further if they are to survive; it is the larger users, who have some flexibility in their demand, who can respond to pricing signals.

147. However, where the basis for charging is too complex then customers cannot respond in any normal way to price changes. There is then a significant danger that a utility raising tariffs to achieve financial cost recovery and/or to influence demand might run into unexpected customer responses which end up achieving none of their desired goals.

148. Table 3.6 summarises the various approaches to tariffs and the questions that have to be asked about each approach. For the majority of utilities with which AfDB is engaged it will be a significant enough challenge (in political and social terms) to enable those providers to move towards cost recovery by simply applying a percentage increase to existing user fees without also requiring a change in the basis of how those charges are levied.

149. These Guidelines therefore recommend the preparation of a clear timeline to achieve cost reflective tariffs, applying the RPI + K factor described above, according to the existing basis for charging. Consideration of the reform of that system may well be a second order priority.

150. In the longer term it is recommended that tariff systems are simplified. Utilities should consider carefully methods of reducing the costs of metering through contracting out some of the services. Where a utility has achieved universal service coverage so that neighbours cannot unfairly on-sell "free water", flat rates can be considered for domestic supply. However, industrial and large commercial consumers should continue to be metered at LRMC tariff levels.

151. For metropolitan towns and those with more limited water resources metering is appropriate and more affordable. Ideally there would be a move towards a single volumetric price for water for all consumers with any variation coming in the fixed charge relative to connection pipe size.

**Table 3.6: Summary of charging options**

TYPE	DESCRIPTION	IMPACT ON REVENUE ADEQUACY RECOGNISING SIMPLICITY AND ENFORCEABILITY			IMPACT ON SOCIAL FAIRNESS	IMPACT ON CONSERVING THE WATER ENVIRONMENT
		Stability & Predictability of Revenues	Ease of Administration	Enforceability		
					'Developing poor', 'Coping poor', 'Very poor', 'Destitute'	
Household/ Property- based	Fixed per connection size	<i>High</i>	<i>High</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>
	Variable and/or 'Progressive' (pro- poor) By number of persons in household By property characteristics eg taps/bathrooms	<i>High</i>	<i>Medium</i>	<i>Low over time</i>	<i>Medium</i>	<i>Low</i>
	By property valuation By property size/frontage/ built area Addition to council tax	<i>High</i>	<i>High</i>	<i>High</i>	<i>High</i>	<i>Low</i>
Volume limited	Entitlement to water is defined (absolutely, or qualified by actual availability) Fixed charge for limited volume per day Flow limiters Intermittent supply Time based household tank filling Volumetric controllers	<i>High</i>	<i>High</i>	<i>High</i>	<i>Medium (for large &amp;/or multiple households on connection)</i>	<i>High</i>
Volumetric metered	A fixed rate per unit water received, where the service charge is directly related to, and proportional to, the volume of water received.	<i>High</i>	<i>High</i>	<i>High</i>	<i>Medium</i>	<i>Medium</i>
	Incremental block systems Lifeline blocks Average accounting cost blocks Average incremental cost blocks Large user discount blocks	<i>Low</i>	<i>Low</i>	<i>Medium</i>	<i>Apparently high but not for multiple households per connection</i>	<i>High</i>
Mixed	Some combination of fixed charge plus volumetric charge	<i>Medium</i>	<i>Low</i>	<i>Low</i>	<i>Medium</i>	<i>Medium</i>

(continues next page)

Seasonal & Interruptible	Higher charges in dry season/ season of peak demand Large users accepting interruptions in peak demand season in exchange for lower tariffs	Medium	Medium	Medium	Not applicable	High
Connection charges & infrastructure development charges		Medium	High	High	Low	Not applicable

152. Where incremental block pricing cannot be avoided it is recommended that, in addition to specific connection size fixed charges:

- large users are charged at the long-run incremental cost of water,
- average domestic (and institutional) consumers are charged at the average historical cost of water and
- there is a limited lifeline block (5 or 6m<sup>3</sup> per connection per month maximum allowance) for the poorest only with, ideally, some provision to reflect household size and/or numbers of households per connection.

153. The level of the lifeline block is not judged only by affordability but also by the amount of surplus revenue raised through the excess of large user incremental tariffs above the average cost of providing water. This is to ensure the imperative of adequate revenue collection to ensure capital maintenance for serviceability. **The charge for the lifeline block should not be less than the O&MM costs so as to limit the potential for distorting customers' understanding of the value of water.** In addition, and potentially controversially, lifeline blocks should be targeted only at the poorest housing areas, i.e. informal settlements including slums, shanties and tenements. Recognised formal housing areas should not be eligible for the lifeline block. The principles of simplicity and enforceability in tariffs, allied with the principles of IWRM with consumers understanding something of the economic value of the resources being consumed, require a move towards a single volumetric tariff for the majority of users.

### 3.13 Connection Charges

Infrastructure development charges	Charges on new customers to reflect the costs of system expansion over and above the existing tariff
Connection fees	Fees to cover the direct cost of installing new connections

154. Infrastructure development charges and connection charges, payable as new customers connect, are an apparently useful means of raising capital funds to pay for extensions of distribution systems to service those new customers and to pay for the tapping of the main water pipeline and the pipeline to the house. However, they presuppose that existing customers have paid the full cost of connecting, which is not always the case due to general utility financial mismanagement. Infrastructure and connection charges also tend to ignore the

extent to which new customers also impose additional costs on treatment and transmission assets, costs which are readily recovered through normal user charges. In practice there is generally one connection charge which covers a random proportion of the actual infrastructure development costs and may or may not pay for the physical connection.

155. A difference has to be recognised between commercial, industrial and housing developers, individual, middle-income household connectors and low-income, tenement, slum and shanty, room-renting households wanting to connect. For the latter group the infrastructure development charge and the connection charge is simply an unaffordable barrier to entry which needs to be removed. Initially this might be achieved through special arrangements where the charges are initially absorbed by the utility and an additional monthly fixed payment is made by the household to pay back the costs of connection over two to five years. Any revision of charges however should seek to reduce the connection charge, for lower-income customers, to a point where it better reflects the ability of the household to pay future consumption charges. This, it might be noted, is the approach taken by market-oriented mobile phone and cable television providers. Higher-income and industrial users can be charged at a level which experience demonstrates they are willing and able to pay, without resorting to self-supply or illegal connections.

### **3.14 Basis for charging for water from kiosks & communal water points**

156. Charging for water taken from kiosks (standposts/tap stands/communal water points) is a special case, particularly as the target group should only be the “very poor” and “destitute” as described above. Slightly higher-income levels of poverty should be enabled to access water through differentiated connections, also described earlier. By these approaches, the numbers accessing water through kiosks (communal water points) would be relatively limited. Therefore it is possible to allow a subsidy, perhaps by allowing access to water from the kiosk or communal water point at household rates (rather than the more common high-user rates or even free rates). Some countries require the local municipal council and/or social welfare to pay for average kiosk water use according to the normal household costs of water. It is strongly recommended that all water kiosks be metered. Where kiosks are not metered, then assumptions have to be made as to average consumption and therefore cost.

157. In reality, many low-income users remain dependent upon kiosks to access water supply due to the failure of the utility to extend appropriate distribution systems. In these cases the kiosk can be metered with that cost shared out between households in the surrounding community per family, per person, per property value. The challenge is then that a greater level of community organisation and trust is required from the poorest households than is normally seen in higher-income households. Alternatively assumptions can be made about consumption with a water rate, charged as an addition to local council taxation, either per household or as a percentage of ground/property rent. This approach fails when housing is deemed to be illegal and no council tax is raised.

158. For some utilities in the transition phase, consumption from kiosks is substantial and therefore a necessary source of revenue. One way of ensuring that revenue is to rent out the communal water point as an “individual concession” or “water kiosk”. The kiosk operator buys water in bulk from the water utility, then re-sells to customers who buy in containers such as

the common 20-litre container. The kiosk operator has full control of the water business and sells water at fixed rates, as agreed with the utility. There are several measures to prevent non-payment of bills and overcharging by the operator. Methods include flexible payment systems, such as weekly billing to avoid accumulation of the water bill. Other methods of distributing water include punching holes in a card, suitably numbered, as water is taken or through purchase of tokens etc. Recently the use of electronic prepaid meters has become possible whereby consumers pay in advance for an electronic token which allows so many accesses to a fixed volumetric discharge or which allows for a certain volume to be drawn down over several visits. There have been problems over the maintenance of such systems but some countries are now finding them very useful and encourage their use in all low-income households, not just kiosks. The utility can also use various approaches to enable the operator pay the water bills.

159. The costs incurred by the utility in arranging for payment through standposts are higher than for normal connections and utilities are therefore tempted to make additional charges accordingly. This disadvantages the poor who are most vulnerable to these higher charges. In the same manner that a multitude of small household connections cost more to a utility for delivery of water relative to large users, but these costs are absorbed in the name of social fairness, then similarly the additional costs of standposts should be absorbed, allowing low-income consumers to pay only the average consumption charge, or the lifeline charge where that is used. It is proposed that utilities should sell water in bulk to kiosk operators at lower than average rates, thus cross-subsidising with the higher income groups who have individual connections, to achieve social equity goals.

160. There is a similar challenge in ‘regulating’ the prices charged by neighbours with a household connection on-selling their water, or water vendors taking water from authorised (or unauthorised) distribution points to re-sell to those without connections. Whatever regulations or advice given it is likely that these unauthorised sellers will continue to charge an unfair mark-up to which may well be added the cost of moving water in small containers, again with a mark-up. These Guidelines suggest that little attempt is made to regulate this important service. If the incremental blocks are sufficiently limited (see above) then the water charge from these points will not be unduly discriminatory (as it has to be if high life-line blocks are incorporated). In principle, water utilities should not prohibit on-selling of water, because this is a way of reaching those un-reached by the utility for whatever reason.

161. The guidance is that all such on-selling or retailing of water to the poor represents a business opportunity being missed by the direct provider and that any project or investment by the Bank should be, at least in part, focused upon delivering water conveniently by pipe to those customers who are clearly able to pay. Part of that process of upgrading service delivery is to recognise the current livelihoods dependence of water vendors on their trade and due allowance should be made in any project to provide training for alternative work, for example as meter readers and plumbers, or better still as part of the utility’s supply chain. Those who have been water vendors are best placed to be contracted to operate water kiosks.

### 3.15 Basis for charging for networked sanitation - sewerage

162. As for water supply, the operating expenditure, capital maintenance expenditure and cost of capital is determined for the sewerage network and for whatever wastewater treatment is undertaken, including the cost of effluent discharge. Where the water supply is metered it is appropriate to apportion the total wastewater costs relative to metered water consumption, though possibly with an allowance for non returned (to sewer) water of approximately 20%. The total revenue collected remains the same but it is charged on 80% of the water consumed in order to help the customer understand that the charges are fair.

163. Where wastewater is treated to secondary level and sludge appropriately disposed of the cost of the networked sanitation system, sewerage, relative to metered water costs may be in the region of 120%. Many systems only charge the equivalent of 20% -30% of water costs which represents a very significant subsidy to the few higher-income households who may have sewerage connections.

164. Where water services are not metered, the costs can be similarly apportioned by the number of households receiving the service (not all households as in some systems) though for social reasons this can be made more 'progressive' with charges weighted according to property characteristics.

165. Storm water drainage, primarily draining rainwater from roads, should be charged for separately as part of local municipal taxation and/or road user charges/license fees. However, many storm water sewers become mixed (deliberately or accidentally) with foul water sewers and then it becomes more difficult to apportion costs. It is recommended that an attempt should be made to share costs fairly between households with sewer connections, road users and all urban households who benefit from urban drainage (some systems require householders to pay the entire costs which is not equitable). Service providers need to discuss provision of road drainage with the agency responsible for roads, with the costs apportioned according to an agreed formula.

166. Households with non-networked sanitation, septic tanks and pit latrines of various types, occasionally need to have the tank or pit emptied and the resulting sludge disposed of safely. Where the accepted discharge points are to the public sewers (or direct to the waste water treatment plant) then the user fees for discharging the effluent should be similar to the charges for disposal of industrial waste water.

167. Industrial waste water disposal, also known as "trade effluent", and defined as "any waste derived from trade premises other than "domestic" sewage" should follow the 'Polluter Pays' principle. This means that tariffs should reflect the costs of treatment, which will depend upon the volumes and strengths of the wastewater that is taken away and/or treated. Average household strengths will vary from place to place. As an example, in the UK the average household strengths are now assumed to be 650mg/l COD (Chemical Oxygen Demand) and 450mg/l SS (Suspended Solids).

168. Septic tank sludge, and even more so pit latrine sludge, are highly concentrated and although requiring only occasional emptying will incur higher unit charges where a

comprehensive system is in place. Charges for trade effluent are, in the most sophisticated systems, determined by occasional sampling of the effluent to determine an average charge. Septic tank and latrine emptying do not need to be sampled but are assumed to have a relatively constant but much higher level of Chemical Oxygen Demand (COD) and suspended solids (SS), within the range 2,000 to 9,000 mg/l SS. In contrast abattoirs discharge blood wastes with a COD of around 200,000 mg/l, breweries with effluent COD in the range of 3,000 to 8,000 mg/l and textiles large volumes of effluent with COD in the range 500 to 3,000 mg/l.

169. One approach to charging for these varying strength effluents is through a formula (often referred to as the 'MogdenFormula', named after the sewage treatment works in Middlesex, UK where it was first used in 1936) that accounts for the additional costs of sampling and analysis of the trade effluent, reception and conveyance through sewers (R) plus volumetric and primary treatment (V) with an additional volume charge if there is biological treatment (Bv) or treatment and disposal where effluent goes to a sea outfall (M for Marine), plus the costs of biological oxidation of settled sewage (B) relative to the strength of average domestic sewage plus treatment and disposal of sewage sludge (S) again adjusted for strength of trade effluent relative to average domestic.

Trade effluent charge =  $R + [(V + Bv) \text{ or } M] + B(Ot/Os) + S(St/Ss)$

Ot - chemical oxygen demand (COD) of effluent after one hour quiescent at pH7

Os - COD of crude sewage after one hour quiescent settlement (600mg/l ?)

St - total suspended solids of trade effluent at pH7

Ss - total suspended solids of crude sewage (400mg/l)

(Source: Tariff Structures and Charges, Ofwat, annual)

170. Note that none of these approaches accept the discharge and treatment of heavy metals discharged by industry, which are required to be (and have to be assumed to be) treated properly on site at the full cost of the entity producing them.

## STEP 5: IMPLEMENTATION

### 3.16 Sources of funds

171. The AfDB is the provider of choice for African utilities seeking finance to improve both the coverage and the quality of urban and/or networked water and sanitation services. In particular the Bank is committed to provide finance to extend service coverage to the poor, living in informal settlements/slums/ shanties, as part of its commitment to assist RMCs achieve the MDG targets for water and sanitation. This commitment to financing is made in the context of these Guidelines, aimed at achieving full financial cost recovery through relatively efficient direct service providers within a limited time frame. With this approach in place, finance should not be a constraint.

172. Within the urban sub-sector there may be a temporary need for additional micro-finance to enable low-income households to pay connection fees. It is preferable that utilities themselves take a more proactive approach to enabling new connections by reducing the connection fees for low-income households, then recovering the costs through an appropriate increment to the normal user fees. However, where any such change is temporarily limited by government policy, it is recommended that the utility itself should finance the amortization of household connection costs over two years, with financing made available where necessary from donors such as the AfDB. In particular circumstances there may be a need for micro-finance to support new connections though this should not result in higher overall costs to poor households.

### 3.17 Payment mechanisms

173. User fees are only accessible as revenue if they can be collected. Consideration of levels and structures of user fees must therefore include proposals for payment mechanisms. The overall guidance is that utilities should make the payment process as easy as possible. For lower-income customers, allowance must be made for payments to be 'little and often.' For customers who buy cigarettes singly, or rent newspapers rather than purchasing outright, it is unrealistic to assume that monthly water bill payments will be consistently achieved, irrespective of the intention. Occasional and daily paid labourers, the 'very poor' and perhaps the 'coping poor' usually cannot accumulate and preserve, untouched, the money required to pay a monthly charge. The utility should therefore demonstrate flexibility and design a mutually acceptable revenue collection system, for instance that which allows fortnightly or weekly collection of payments for water consumed by the poor.

174. Water vendors, with much higher charges, understand this and collect money from households, often on a daily basis. Utilities who can and must serve this income group at a lower charge should also put in place systems to collect door to door, little and often, perhaps

contracting-out that collection service to the vendors who are no longer required to carry water. Partly for this reason, to enable and simplify bill collection, fixed tariffs can be a more appropriate charging system for low-income customers. It is possible to devise systems where fixed charges are used but there is an area meter which, with the customers'/community's prior agreement, is used to ensure that overall consumption is kept within an agreed amount. This then avoids the need for meter reading and individual accounts as does the fixed volumetric approach. This method is not applicable in all communities, and should be applied only in situations where there is a sense of "community spirit" and willingness to pay fixed tariffs irrespective of actual amounts consumed by each household.

175. Middle-income customers also benefit from payments systems perhaps through local shopkeepers, again accessible but not necessarily requiring daily payments. Weekly payments into an account which can later be balanced against metered consumption are appropriate. Utilities in high-income countries benefit considerably from the use of direct debits from customers' bank accounts, being both timely and cheap.

176. Pre-paid meters simplify both the billing and collection process, working either on a time-limited or a volume limited basis. Many customers prefer the security of knowing that they are not liable to run up an unaffordable bill, perhaps due to a leaking pipe in the household or even a child forgetting to turn off a tap. Recent experience in the low-income areas of one metropolitan African city demonstrated this with a reported 90% voluntary take-up of pre-paid meters. Pre-paid meters are seen to have potential not only for domestic users but also for governmental institutional consumers. While considered simple to use, maintenance costs of this technology have been seen to pose a significant problem for the service provider.

177. As banking habits extend to lower-income customers, direct payments from bank accounts should be encouraged for the benefit of both the utility and the customer. But that does raise the issue as to whether customers who cost less to collect from should share in the benefit of that lower cost, and therefore whether customers who need daily household collection should pay more for that service? Cost reflectivity suggests that the higher-income groups should in fact pay less. In practice, most utilities find a compromise whereby they encourage higher-income customers to use bank transfers with a small reduction and they subsidise collection from the poorest to ensure adequate service, particularly for continuity of basic needs and public health provision, reasonable revenue collection and to avoid the costs and additional challenges of having to rely upon disconnections as a means of ensuring payment.

178. Utilities need to have a clear disconnection policy, if they are to enforce water user fees. Disconnection should always be a last resort, and if used regularly, indicates a failure in collection procedures. Where households have run into financial difficulties, the aim of the utility is not to penalise them but to enable them to return as quickly as possible as good paying customers. Where customers have fallen into arrears, utilities need to use approaches which allow for gradual re-payments of those arrears along with payment of user fees for current consumption. High reconnection fees for domestic customers are therefore not a good idea as they simply exacerbate the financial situation. However customers should have the perception that sanctions, disconnection, will be applied to defaulting consumers.

179. In summary the expectation is that water and sewerage utilities will act like customer oriented traders, who want to win and retain long-term paying customers, using all the

appropriate methods of marketing experts, if they are to ensure collection of revenues that are the basis of their operations.

### 3.18 Ensuring sustainability

180. Establishing appropriate water user fees and full financial cost recovery for urban/networked water and sanitation services is a long-term process. The selection and use of appropriate mechanisms should be a matter of practical convenience, e.g. it is a good principle to use a system that is already in place and which either works or can be made to work with minimum investment. These Guidelines emphasise the practical approach, looking for ways to balance IWRM principles with the needs of the utility to be financially sustainable whilst significantly extending and improving services to the poor.

181. However, using the system that is in place whilst facilitating a move towards more effective, equitable, sustainable, efficient and transparent user fees is a significant piece of work which should not just be 'added on' as an afterthought to a conventional infrastructure investment project. It requires the agreement and ownership of all relevant stakeholders, the acceptance that user fees will have to rise (and an understanding of the reasons behind those rises) if cost recovery is to facilitate improvement of services. A credible cost recovery system requires the long-term commitment of politicians and senior civil servants to manage the necessary increases of user fees, to include annual inflation rises, whilst also allowing improved, paid for services to 'illegal', informal housing.

182. Depending on the policy environment in the country, each of these elements may require change in government policy and practice. Implementation of cost reflective user fees is therefore a 'change management' process which is likely to require the setting-up of some form of economic regulation, or even an economic regulator. Customers, present and potential, should be involved, both formally through some level of customer committees and informally through surveys and focus groups, particularly amongst the poor. Civil society, NGOs, mass media, as well as local politicians and utility managers, should be convinced of the value of the change management process, being made aware of the reasoning and ultimately taking-up their own level of ownership of the principles. There needs to be an advocacy and communications programme to advise stakeholders as to the reasons and justification for changes in tariffs. Industrial and commercial customers are also included so that they can recognise that they are not being unfairly used as a vehicle for cross-subsidies but rather that there are genuine environmental costs which are part of their costs of doing business. Institutional customers, often the worse payers in lower-income countries, have to be enabled to pay those bills, for instance through direct withdrawals from their budgetary allowances.

183. Donors and lending agencies should work together towards the common goal of user fees and cost recovery, acknowledging that no single project is likely to be a suitable vehicle for significant reform unless all stakeholders agree. In advance of that agreement, Project Logframes and Appraisals should specify the target to which any individual project can reasonably aim, ensuring adequate provision of budgetary support of subsidies for capital maintenance where full cost recovery is not immediately achievable. Individual projects should specify the phased approach to cost recovery that is planned and the policy discussions held with government to that end.

184. Cost reflective user fees for urban and networked water and sanitation services are significant for achieving financial sustainability. In the urban sector, user fees are critical to enable improvement of services, through appropriate capital maintenance, and extension of service coverage to the 'developing poor', the 'coping poor' the 'very poor and the 'destitute'. Although user fees are important for all categories of customers, good tariffs are especially important for the poor. When appropriately designed, cost recovery facilitates access to low cost, clean and convenient drinking water and sanitation for all.

## **PART 2**

# **KNOWLEDGE RESOURCES FOR USER FEES AND COST RECOVERY FOR URBAN, NETWORKED WATER AND SANITATION PROJECTS**

## 4 REVIEW OF AfDB USER FEES AND COST RECOVERY POLICIES

### 4.1 A summary of AfDB's historical policy on cost recovery in the utilities sector

#### 4.1.1 AfDB's Integrated Water Resources Management Policy and Framework for Public Utility Tariff Policy

The IWRM 2000 policy outlines the Bank's policy on user fees and cost recovery. These Guidelines complement the existing Utility Tariff Policy entitled "Framework for Public Utility Tariff Policy", which was approved by the Bank in 1985. In this section the discussion and recommendations in the policy are summarised, because this Framework remains valid and useful in guiding implementation of the cost recovery requirements of the IWRM Policy. The original definition of a utility (Electric Power, Telecommunications, Water Supply and Sewerage) did not refer to Irrigation but the issues are common.

*The Bank is interested in developing and establishing viable institutions. These utilities may be more important to long term development than the immediate resource transfer of the Bank's loan. In preparing the policy the Bank recognised that raising enough revenues to cover at least operations and maintenance costs has become a growing concern in lending to utilities. Losses in utilities' operations are widespread, both because of poor operational efficiency and of non-existent or improper pricing policy for the services they provide.*

*The policy also recognises that utilities are capital-intensive, often face increasing demand from existing and new consumers, and require large and costly investments to expand their facilities. The often large and growing population in RMCs make it [particularly] necessary not only to replicate projects but to expand them so that a larger number of people could benefit from utilities' services. To be self-sustaining, the level and/or structure of their tariffs should be such as to enable them to meet certain performance criteria, The role of tariffs is two-fold: one is to signal to consumers the cost to the economy of the resource use resulting from their consumption of the services; the other is to provide the revenue necessary for the continued operation and maintenance of the facilities of utilities, to service debt and to generate surplus funds in a reasonable proportion for their expansion programme'.*

*The Bank Group's overall experience suggests that, regardless of the institutional framework or legal set up, the strategies for improving the financial performance of a utility should concentrate on two aspects : one is to control costs and make the best use possible of the facilities and manpower, the other is to raise revenues through tariffs.'*

*Since tariff levels and structures affect household budgets and welfare, provisions can and often are made to allow minimum consumption at low prices by those unable to pay the full cost of the service. If required tariffs exceed what low-income groups can afford then cross-subsidies*

*between users or direct subsidies from the government might be called for in order to maintain the financial viability of utilities. Allowing minimum consumption for the poor at a subsidized rate is generally not much of a problem if the higher-income domestic, commercial and industrial consumers can be made to pay the full cost of supply. Empirical studies have shown that the "poor" households typically use disproportionately less of the subsidized services than the other categories of consumers. Therefore holding down tariffs in the face of rising cost cannot often be justified on the grounds of income distribution.*

*The pricing policies followed by utilities are largely determined by the nature of the service they provide. The principle of paying for the power supply and telecommunications services is relatively well established. This is not so however with respect to sewerage and water supply services. First, the idea that water is a free good dies hard; what is not generally understood is that while water might be a free good, its extraction, treatment and storage, transmission and distribution are not and should be paid for. Second, there has been a habit in some RMCs of providing free or subsidized water so that attempts to recover costs through user charges are met with resistance. Ingrained habits are difficult to change and the process will typically take time; and third, because water is a basic human need, a minimum should be provided to sustain life regardless of the income level of the beneficiary. A utility in the water and sewerage sector is further constrained in recovering costs wholly through user charges because of the important health benefits to be derived from the consumption of potable water and the proper disposal of used water. This constraint is more stringent for sewerage where the benefits to be derived from the system are not immediately obvious to beneficiaries. However the policy also recognises that subsidies can encourage the use of inappropriate technologies.*

#### **4.1.2 Issues and objectives in utility pricing**

*The multiplicity of objectives and the trade-offs involved make the subject of utilities pricing controversial. Much of the controversy arises from the lack of consensus on the boundaries to be drawn between the role of utilities as instruments of government's social and economic policies, and utilities as simple commercial ventures. The implications of economic, financial and policy objectives may conflict in particular instances, and pricing decisions may involve trading off one objective against another.*

#### **Economic objectives**

The efficient allocation of resources is an important consideration in developing pricing policies for utilities' services. It is desirable in RMCs where the alternative is the additional output that could have been generated and which they could ill-afford to give up. Economic theory suggests that an efficient allocation of resources is achieved when price equals the marginal cost of supplying the service, which is the increment to total system cost of producing and delivering an additional unit of output under specified circumstances.

For an efficient allocation of scarce resources, consumption should be encouraged when its valuation by consumers exceeds the added cost of supply, and discouraged whenever it is not the case. Economic theory also suggests that important divergences between social costs and benefits on the one hand, and market price on the other (due for example to external effects) should be taken into account, and that public enterprise investments should be evaluated in terms of opportunities for investment or consumption foregone elsewhere in the economy.

Incremental costs which include capital as well as operating costs are the economic costs of providing for additional demand. The "ideal" pricing policy in terms of efficiency and resource allocation is to set prices equal to marginal costs. The average incremental cost is defined as the present worth of the least-cost investment and operating and maintenance cost stream per unit of incremental output (also defined in present worth terms). Average incremental cost approximates the long-run marginal cost and serves as a guide for investment decisions.

### ***Financial objectives***

The financial viability of utilities has two purposes: one is to enable them to be self-sustaining and to have a certain autonomy in their day-to-day operations, the other is to relieve governments from at least some of the financial burden associated with the continuous provision of large amounts of scarce public funds. If financial viability were to be ignored, the incentive to hold down costs may be weakened, if not removed.

Revenues earned from the sale of services generally implies an ability to generate sufficient revenues to cover operating and maintenance costs, renew assets, service debt, pay dividends on equity capital where appropriate and finance a reasonable proportion of capital expenditures from internally generated funds. The definition of cost-reflective revenues encompass present day descriptions of total revenues needing to equate to the sum of operations and minor maintenance costs, capital maintenance costs and the cost of capital.

The financial performance of an enterprise is often measured by a financial rate of return, which is the ratio (in percentage) of net operating income (before interest) to total net fixed assets in operation taken as an average between the beginning and the end of the year, suitably revalued from time to time to reflect changes in asset value. The level of return indicates the extent of costs recovered and should in broad terms approximate the opportunity cost of capital in the country concerned.

A rate of return is an appropriate measure of financial performance in situations where utilities, as is often the case in RMCs, have a complete or substantial monopoly on the output in their sector of activity and where utilities in these capital-intensive sectors face steadily increasing demand from existing and new consumers and require large investment programmes to expand their facilities. Given the scarcity of public funds and the inadequacy or absence of capital markets, rates of return are designed to encourage the generation of sufficient cash to provide a reasonable proportion of the funds required for investment after operating and maintaining facilities and meeting other financial obligations.

The main limitation of a rate of return is that it cannot ensure that operations will yield enough cash when needed. If the operating performance has been poor, particularly in the areas of billing and collection of accounts receivables, measures should be taken to ensure that these activities are efficiently carried out. Given that the rate of return cannot ensure that operations will yield enough cash when needed, the level of accounts receivables should be kept at a minimum, and preferably not exceed three months' sales.

The rate of return test is widely used as an acceptable measure for evaluating the financial performance of utilities. Financial viability and therefore the level of the rate of return

required to meet it should, however, not be pursued through tariff changes alone, but also by holding costs down through increased efficiency of operations and management.

### **Affordable Tariffs**

In cases where a decision on whether or not to subsidize is to be taken, the following should be kept in view:

- (a) there are difficulties in identifying and reaching target groups and ensuring that they are the ones that get the benefit of the subsidy ;
- (b) what people of low-income levels, especially in urban areas, gain through cheap utility services (electricity, water and sewerage and telecommunications) might be lost through rent increases;
- (c) subsidization might bias technological choice to more expensive alternatives;
- (d) continuous reliance on government subsidies may have an adverse effect on the management of utilities by removing incentives to hold down costs;
- (e) subsidizing has a habit forming effect; once it begins, it is difficult to remove and almost impossible to prevent from spreading.

*The Bank Group experience in dealing with public utility enterprises in regional member countries suggests that regardless of the institutional framework, the strategies for improving the financial performance of utilities should concentrate on two aspects: one is controlling costs and making the best use possible of the facilities and manpower; the other is to raise revenues through tariffs.'*

It is recommended that a tariff agreement under Bank loans to utilities should, whenever appropriate, be established, preferably in the form of a rate of return covenant. The rate of return on net fixed assets in operation has the advantage that it is simple and can readily be defined from accounting principles and calculated from standard financial statements. It however presupposes:

- (a) The existence of an efficient accounting system held on an accrual or commercial basis capable of making reliable data available on a timely basis.
- (b) A commitment to the revaluation of assets, based on a formula worked out to arrive at an updated appraisal of such assets either on the basis of replacement cost or an index following price movements internationally and domestically. In order to ensure adequate capital maintenance for long term sustainability, utilities and/or regulators should increasingly rely upon the use of current cost accounting.

## **4.2 Summary of AfDB's policy on cost recovery in water, sanitation and irrigation**

In 2000, the Bank produced an Integrated Water Resources Management Policy statement. The policy recognised that getting the prices right is at the very core of improving water resources management. In the process of establishing an appropriate fees and tariff structure, economic, financial and social considerations play a crucial role. Prices provide signals, and social welfare

and allocative efficiency are maximised, when prices charged equal the cost of producing and supplying water. This is the meaning of treating water as an economic good.

The IWRM sets aspirational goals of full economic cost recovery, with pricing at the core of improving water resources management - but notes that full financial cost recovery is a more immediate goal, and that lifeline supplies should be available at minimal prices. The implications of the wide spectrum of national, sectoral and local situations that the Bank faces - and must take account of in its operations - is clearly recognised.

The process of project appraisal in the Bank introduces financial and economic analysis at a late stage - generally after technical, physical and organizational definition of the project. Rather than being an integral part of project design - testing the feasibility of project design against economic, financial, and cost recovery criteria - the economic and financial review is effectively an ex-post check that the project meets broadly defined viability criteria but provides no assurance of financial sustainability.

An existing paper covers standards and procedures for financial accounting that are comprehensive in scope and fully adequate to guide financial accounting aspects of ensuring overall revenue sufficiency - once the scope of and approach to cost recovery has been identified. However, the Guidelines for Financial Governance and Financial Analysis of Projects say nothing about reasonable or acceptable levels of subsidies, potentially between different groups of consumers, between regions, between sub-sectors, between rural and urban and between countries.

Approaches to national, regional and specific location tariff setting vary widely. Further, the AfDB operates in parallel with other donors and inconsistencies between broad policies of different donors will be difficult to resolve - especially when the user-fees resulting from different donor policies are inconsistent. Donor coordination is a means of addressing this issue, but will often be imperfect. Production and implementation of the Guidelines is intended to help Bank staff, RMCs and other stakeholders have a common basis to engage on the issue of cost recovery and setting charges.

### 4.3 Relevant African Development Bank policy papers & Toolkits and Guidelines

The following papers and Guidelines have been identified and reviewed while compiling the present Guidelines on User Fees and Cost Recovery for water, sanitation and irrigation projects.

DATE	TITLE
2000, Apr	Policy for Integrated Water Resources Management
2005	Toolkits for Financial Governance and Financial Analysis of Projects
2005, Dec	Investment in Agricultural Water for Poverty Reduction and Economic Growth in Sub-Saharan Africa, Draft 12/31/2005
2005, Dec	Microfinance: policy and strategy for the Bank group
2005, Dec	Integrated Urban Development Policy, Strategy Paper, Draft Report December
2005, May	ADF-X Financing policy toolkits

2005, May	Annual Report 2004, African Development Bank
2005	Rural Water Supply and Sanitation Initiative - Implementation Plan and Resource Mobilisation Strategy
2005	African Water Facility
2005	Operational Toolkits on User Fees in Health and Education
2005	Overview of Water Sector activities and initiatives
2004, Aug	Strategic Plan 2003-2007
2004	The Private Sector Development Strategy
2004	Gender, Poverty and Environmental Indicators on African Countries
2002	Rural Finance Toolkits
2002, Oct	Operational toolkits for the rural financial subsector
2000	Africa Water Vision 2025
2000, Jan	Agricultural and Rural Development Sector Policy
1999	Operations Manual
1999, Dec	Review of the Bank's experience in financing rural water supply projects
1985	A framework for public utility tariff policy (Electric Power, Telecommunications, Water Supply and Sewerage)

## 5 INTERNATIONAL REVIEW OF COST RECOVERY

In this section a brief review of cost recovery internationally is provided (Gerlach, 2006).

### *Financial charges versus economic costs*

Claims for the merits of “pricing” typically go beyond that of maintaining and operating infrastructure, and suggest that if “*the prices are right, allocation will be optimal.*” From the point of view of users, which is critical when considering political economy of reform rather than theoretical elegance, there are two radically different types of cost. First, there are the costs that any user can understand, namely the financial costs associated with pumps, treatment plants and pipes. Second is the far more subtle concept of the opportunity cost of the resource itself. There have been many proposals for doing sophisticated calculations of this opportunity cost, and charging users for this “*to ensure appropriate resource allocation.*” This has not worked in practice for two fundamental reasons. First, because it is impossible to explain to the general public why they should pay for something that costs nothing to produce. And, second, because those who have implicit or explicit rights to use of the resource consider such proposals to be the confiscation of property.

An added, and very important, factor is that the ratio between financial and opportunity costs is often radically different for different sectors. It costs a lot to operate the dams, treatment plants, pumps and pipes that provide households with the modest amounts of water they use. Alongside these large financial costs, the opportunity cost of the resource itself (as measured by the value of the raw water in its next best use, often irrigation) is typically quite low. For municipal and industrial water, therefore, financial costs generally dominate opportunity costs. Accordingly for water supply and sanitation, the major focus of discussions of “water (supply) as an economic good” focuses on financial costs, and the associated issues of accountability, sustainability and transparent subsidies to ensure that the poor have access to services.

For irrigation the situation is almost exactly the opposite. It costs relatively little (per unit of water) to build, operate and maintain the usual gravity systems that provide very large quantities of water. But where domestic water availability is limited, the opportunity cost of the water is often much higher than the financial cost of supplying the water.

These numbers have profound implications. They mean that, from the point of view of ensuring that users take into account the cost of the resources they are using, the emphasis must be on financial costs for municipal supplies, and on opportunity costs for irrigation.

The great challenge for irrigation, in light of these theoretical and practical realities, is how to have farmers take account of the opportunity cost of the resource. One solution is formally defined as tradable water rights, which have the unique virtue of allowing reallocation of water on the basis of voluntary and mutually-beneficial agreements between willing buyers and willing sellers, rather than a matter of continuously adjusting prices for all users to find some

optimal level that perfectly balances supply and demand while meeting social and economic objectives, or an endless search for new sources of supply.

This is not to suggest that the establishment of water markets is simple or a panacea. The operation of such systems is demanding in terms of rules for establishing initial rights (including those for the environment and informal customary rights, especially of the poor and women, and ensuring that the rights of small users are recognized and protected); the infrastructure required to measure and move water; the regulatory institutions that are essential to protect the rights of other water users and the environment and to ensure that the public interest is represented; and the information and management systems.

While these prerequisites may seem onerous, they are really prerequisites for any form of well-managed allocation system and the absence of such prerequisites is a problem for all allocation systems, including the administrative allocation systems practised in most countries. Second, one of the many virtues of a market-based system is that, once started, there is a strong demand for better measurement, transparency, regulation and information. Third, all such established systems are working reasonably well, often after initial adjustments. In none of the countries that have adopted such systems is there any thought of returning to the previous allocation procedures.

IWRM policies stress the need to improve governance, to meet the needs of the poor, and overall, the importance of water services (in all sectors) in alleviating poverty. There is a greater need for financial sustainability than the “Dublin” view that water is an economic good and treating it as such will automatically improve its management and allocation.

The policy objectives emphasise consultation with users, clear definition of the costs incurred in providing the service, effective collection procedures, simplicity in tariff structures, pricing to achieve financial sustainability and recognition of equity concerns.

Internationally, the rationale for pricing water services has been simplified in recent years. Financial sustainability is clearly the major objective, with pragmatic recognition of political realities and the differences between sectors, and between differing income levels of users. The goal is provision of services that are sustainable, and that are financed properly (and preferably to a significant extent by beneficiaries - because governments cannot afford to pay for everything, and historically have failed to do so, and also because the linkage between payment for service and its provision encourages providing agencies to be efficient). Water rights are seen as fundamental to ensuring that water use is constrained to sustainable levels, and where possible, tradable water rights are seen as the eventual best way to reallocate water among uses.

## 6 SUMMARY OF COUNTRY EXPERIENCES

### 6.1 Historical perspective on user fees and cost recovery

Cost recovery has long been a controversial issue among water supply and sanitation professionals. Throughout the 1980s - the International Drinking Water Supply and Sanitation Decade - there were two competing viewpoints.

One viewpoint argued that health and social benefits amply justified the use of public and donor funds to deliver basic services for all. The argument was that O&M funds should be generated locally to prevent the facilities from falling into disrepair and disuse. Some advocated free “water and sanitation for all”. Provision of basic services was, they maintained, a prerequisite for income generation and poverty alleviation, which would bring with it affordability and willingness to pay.

On the other side, it was argued that support from governments and donors would be phased out over the years. Without external funding, systems could not be properly maintained, let alone extended to meet the demands of future generations; and communities would not value or respect facilities in which they had no stake. Thus affordability and willingness to pay must be in balance. In any event, subsidies could usually be shown to favour the rich rather than the poor, while the unserved poor are already paying a high proportion of their incomes for poor quality water from water vendors, or in lost productivity through time taken by women to collect water from distant sources. Therefore, they would be willing and able to pay for appropriate low-cost services, if they were shown to be convenient and reliable.

Over the years, there have been many variations on these basic viewpoints, including compromises between the two positions. Further, the acceptance of water’s function as an economic as well as a social good became mainstreamed when it emerged as the fourth guiding principle of the Dublin Statement on Water and Sustainable Development in 1992. Although this concept has been embraced in water policy frameworks agreed at global level, its implementation has remained difficult given the complex institutional reforms and large sector investments required.

Over twenty five years have passed since the Water Decade and the truth remains that adequate cost recovery is still one of the major obstacles to maintenance and expansion of drinking water supply in developing countries.

It is important at the outset to recognise the special situation of irrigation within the generality of water uses: first, irrigation is by far the largest user of water - 70-85% in many developing countries. Second, irrigation is a *consumptive* user of water - the purpose of irrigation is to remove water from the hydrological cycle and evaporate that water into the atmosphere. Most other uses of water are non-consumptive - most household use and all sanitation use involve changes in the *quality* of the water before returning it to the hydrological cycle. Irrigation is

thus of particular importance where water scarcity is an issue - irrigation takes most water from the hydrological system and doesn't send much back.

Irrigation is a productive activity, leading directly to improved incomes for its beneficiaries. Viable irrigation investments by definition produce benefits that exceed the cost of providing the irrigation service, so that the case for service charges is rather easier to make than in the rural WASH sector, where benefits are real, but not necessarily reflected in financial gains - at least in the short term. Urban water and sanitation (but not sewerage) have also been shown to produce direct economic benefits. Nevertheless, the situation regarding cost recovery and service charges in all three areas has, overall, been equally unsatisfactory.

## 6.2 Summary of concepts and principles

The economic argument is often said to be that the basic principle behind user charges (urban or rural) is that users should pay the economic cost of water services, as the economic price of water should ensure the optimum economic efficiency of water charges. The appropriate cost for users to pay is the long run marginal economic cost, which is approximated by the average incremental cost derived from the least cost method analysis<sup>5</sup>. However, rural or low-income urban communities who are managing their system have problems in understanding this language and applying its concept. The social scientist argument often places emphasis on "water as a basic need", and fear that the economic approach will threaten equity, as it does not fully allow for the social dimension. Many environmentalists would agree that "*managing water as an economic good is an important way of encouraging conservation and protection of water resources*"<sup>7</sup>, mainly by including the cost of preserving water in user charges and by applying the principle of the polluter pays.

Considering specifically drinking water, water is referred to as a social and economic good rather than only as an economic good. According to this view, it is not water but the services involved in providing safe water that have a price; hence water should be considered as a commodity rather than as a good. Clearly, however, the concept of water as an economic good has helped considerably to emphasise the principle that water services must be paid for by someone if they are to be sustainable, and consumers should contribute - a definite but not yet sufficient step towards improved cost recovery.

It is tempting to conclude that the solution lies in a balanced application of all the concepts and principles mentioned above, a sort of syncretism where everything mixes in a melting pot. Decades of conceptual evolution, directly or indirectly linked with cost recovery, have managed to highlight some commonly accepted basic principles, such as the fact that users should pay for water services, and that communities should have a role in managing their water supply and adopt a gender perspective. At the same time, one of the results of this evolution has been to show that there are no blueprints generally applicable to all situations and contexts - indeed

<sup>5</sup> Asian Development Bank. 1999. *Handbook for the Economic Analysis of Water Supply Projects*. Page 190. [http://www.adb.org/documents/handbooks/water\\_supply\\_projects/default.asp](http://www.adb.org/documents/handbooks/water_supply_projects/default.asp)

<sup>6</sup> Desmond Mc Neil. Water as an economic good In: Vision 21 : Water for people. <http://www.wsscc.org/vision21/docs/doc28.html>

<sup>7</sup> Dublin Statement on Water and Sustainable Development. 1992. Extract from principle 4. <http://www.wmo.ch/web/homs/documents/english/icwedece.html>

while theory has evolved to include social, environmental and economic dimensions, the most basic levels of cost recovery required to ensure continued functioning of the assets are generally not achieved.

The practical approach to cost recovery considers only the financial costs of a project or programme, such as operations and management costs, capital costs and possibly investments for future growth and rehabilitation (which includes accounting for depreciation of assets over time). Beyond this “sustainable” minimum, policy then dictates whether part or all of these costs should be recovered from consumers. Even full recovery of the financial costs associated with the operation and management of a system does not guarantee that the system will continue to operate after it is constructed. Water services - whether water supply or irrigation - operate within an institutional context, including regulatory functions (water quality, dam safety, hydrological information).

The reader is recommended also to look at ‘Managing Water for All: An OECD Perspective on Pricing and Financing’, (OECD, 2009) which has usefully popularised the ‘Three ‘T’s - tariffs, taxes and transfers.

## 7 KNOWLEDGE RESOURCES ON NETWORKED AND/OR URBAN WATER SUPPLY AND SANITATION

This section looks at cost recovery and water pricing for networked water services, which are most commonly found in urban settings. In this document, 'urban and/or networked water and sanitation' refers to conventional, piped water supply and sewerage with one or several stages of wastewater treatment.

It is widely acknowledged that piped water becomes a relatively costly product, having undergone a series of collection, transportation, storage, treatment and purification processes when it is delivered to water customers via a networked household connection. It must be recognised, however, that urban water markets in Africa and much of the rest of the developing world differ substantially from the monopoly systems for which much of the traditional water pricing options were developed. There is widespread agreement on the fact that the continuous pressures of rapid population growth and rising poverty levels far exceed the capabilities of conventional public service provision, with service failures occurring on a multitude of levels.

Urban water and sanitation tends to be much less context-specific than rural options or approaches to irrigation management. This fact is reflected in this, which has not attempted to describe experiences in each country in Africa as the rural and irrigation sections do. In the urban/networked setting, there are common, generic principles relating to cost recovery (operation & maintenance cost, plus ideally depreciation/capital maintenance costs plus ideally cost of capital). The country level variation is simply the extent to which countries fail to achieve their aspirations in cost recovery of utility services. That goal is postponed through a spectrum of government subsidies on capital investment and cost of capital or more usually by deferring capital maintenance, therefore representing inter-generational transfer.

Countries are now attempting to challenge their own reluctance to charge viable tariffs through the introduction of economic regulators. There is equally a standard range of methods to charge for revenue: fixed (occasionally progressive fixed) and volumetric, constant or block tariffs which only rarely justify being characterised in terms of individual countries. It may also be noted that networked sewerage is not always given the prominence its high cost deserves. Sewerage, which always comes as a partner to networked water (though not the reverse), is usually charged as an addition to the networked water charge, usually too small an addition. There does not appear to be any particular country-oriented aspect of sewerage charging. The aspect of charging where country policies can be most relevant is that of the smaller networked systems, whether rural gravity flow or small towns.

*This review of international approaches to urban and networked water and sanitation cost recovery was prepared by Dr Esther Gerlach, Cranfield University*

## 7.1 Objectives of water pricing

### 7.1.1 Basic considerations

There is now an increased emphasis on economic cost recovery with consideration of social equity and affordability concerns in the design of water pricing strategies and the allocation of user charges. In the urban context an inclusive approach should be taken, considering a wider range of objectives beyond revenue collection which can or could be achieved. There is a need to harmonise the various and often conflicting objectives and considerations and negotiate inevitable tradeoffs. The following elements may be considered in tariff design, with different importance being attached to each depending on the country context:

#### *Objectives*

- Revenue sufficiency (i.e. cost recovery),
- Economic efficiency,
- Equity and fairness,
- Income redistribution, and
- Resource conservation.

#### *Considerations*

- Public acceptability,
- Political acceptability,
- Simplicity and transparency,
- Net revenue stability, and
- Ease of implementation.

A key element in tariff design is to safeguard essential services in the interest of public health, and to protect a fragile natural environment and increasingly scarce water resources. Attention should be given to social acceptability issues that arise when water pricing structures are adapted to more accurately reflect environmental externalities and resource cost. ‘Social’ water pricing can satisfactorily combine economic efficiency, resource conservation, and equity goals.

### 7.1.2 Social goals: equity and fairness

Within the sector, there are often misconceptions related to the interchangeable use of the terms ‘equity’ and ‘fairness’. Equity is not synonymous with equality; instead, equity demands that equals shall receive identical treatment. In tariff design for public utilities, the equity principle justifies allocating user charges in proportion to the costs imposed by a customer on the provider. Different dimensions of “equity” may be distinguished:

- Equity among income groups - the most obvious social aspect of household water pricing: ...[poorer water consumers] should not have to pay a disproportionately larger part of their disposable income for water services than better-off water consumers do
- Equity among consumer types (re volumetric consumption): Note that measures to provide preferential treatment to lower-consumption water customers could unintentionally penalise low-income (but larger) families

- Equity among regions (geographic inequity in terms of access and quality)
- Intergenerational equity (broadly related to environmental sustainability)

By contrast, fairness is open to subjective interpretation. It is often argued that in developing economies, water tariffs should include a measure of income redistribution. Though distributional effects of service charges are based on notions of ‘fairness’, ubiquitous explicit policy statements referring to the income redistribution objective warrant its inclusion as one of the basic objectives of tariff design. Equity and fairness are frequently discussed in the context of affordability of a service and its user charges. The inter-dependency of access and affordability should be noted. Unaffordable water charges may deny access to essential services, whilst the cost of improved access (service expansion) can have affordability implications if capital costs incurred are passed on to customers. Marginal cost pricing, which has been described as the golden rule of neo-classical pricing theory, is a prime example of an equitable tariff, which may be perceived as unfair by some parties.

For instance, in the late 1990s consultants were commissioned to review and evaluate South African water pricing policy in the light of international trends and best practice with the aim of developing an urban water pricing methodology consistent with social equity, ecological and financial sustainability and economic efficiency principles. The recommendations presented in the resultant report underline the high priority given to social protection objectives in the African context:

- Tariff should be fair in that customers in the same circumstances are treated consistently.
- Tariffs and subsidies should be clear and easy to understand.
- Tariff enforcement should be guided by fairness and consistency.
- Tariff reform should yield a positive cost-benefit ratio.
- Tariffs should promote revenue stability and predictability.
- Consumers should have easy access to relevant information.

However, the tendency of African governments (not unlike that of the majority of developing countries<sup>8</sup>) to overemphasise social considerations in developing pricing policies at the expense of extremely low cost recovery ratios has been a decisive factor in the current state of service delivery. A ten-country study of water and sanitation provision in African cities, covering Benin, Burkina Faso, Côte d’Ivoire, Guinea, Kenya, Mali, Mauritania, Uganda, Senegal, and Tanzania, found that despite contractual obligations to the contrary, water utilities and city-wide authorities fail to provide adequate water supply to 30 to 80% of the population and a staggering 60 to 90% of residents missed out on sanitation services. There was no correlation between ownership (public or private) and satisfactory provision.

There is growing interest in the resulting irregular and fragmented urban water markets and the variety of agents occupying the gaps left vacant by the failing utilities, who particularly (but

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<sup>8</sup> “Willing to pay but unwilling to charge” has become something of a catchphrase describing the self-imposed obstacle to better water services, as many Asian governments hesitate to collect charges for services customers are willing to pay for.

not exclusively) cater for lower and lowest income households. In contrast to the formally appointed water providers, who rely on outside financing and subsidies to cover their costs, alternative - often small-scale and private - providers show remarkable successes in cost recovery. However, water vending constitutes a major equity concern not only where the cost recovery imperative or cartel formation produce exorbitantly high prices. Informal settlements or slums are often considered difficult areas for water utilities to serve. The poorest and most vulnerable families living in un-served or under-served informal settlements or slums end up paying much more to vendors than their wealthy neighbours pay for convenient, clean water piped directly into the home at highly subsidised prices. The challenge is huge, considering that informal settlements in Africa are reported to house between 40 and 70% of the urban population.

## 7.2 Principles of tariff design

The technicalities of accurately determining and fairly allocating costs are particularly complex in the context of urban and networked water services. There is an important difference between economic costs and financial costs, which are not substitutable or interchangeable ways to talk about the same things; rather they are different ways of interpreting situations in that each include some elements not included in the other. While economic costs are future-oriented, financial costs tend to be based on historic, usually average, costs. Accountants make various further distinctions within the narrower definition of “financial costs”, distinguishing between average and marginal costs, historical and current replacement costs, capital and operating costs, and finally, between “at capacity” and “average current utilisation” costs.

Marginal cost pricing has received much attention in the water services sector. The following excerpt of analysis of the cost of various service options for urban areas in South Africa demonstrates the relevance:

*“For an expanding city, with development taking place mainly at the periphery (as has been typical of many of the urban areas in Africa), the relative magnitude of marginal and average current replacement cost is complex. Considering the case of full water-borne sanitation, while the relative magnitude of marginal and average cost of the internal infrastructure is for all practical purposes the same, the relative magnitude of average and marginal cost of the bulk infrastructure is not. The provision of additional capacity at the periphery means providing additional sewer capacity along the whole length of the sewer pipe to the treatment works as well, making the marginal cost of the bulk reticulation more expensive than the average current replacement cost. This is generally offset to some extent by the economy of scale of the treatment works, which makes the marginal cost less expensive than the average cost. On balance it appears that the marginal cost of water-borne sanitation may well be higher than the average current replacement cost, and the same is likely to apply to a reticulated water supply system as well.”*

However, a number of implementation problems are associated with marginal cost pricing. There are difficulties with using historical accounting data, estimating external costs, apportioning joint costs, and addressing equity-related concerns as the main problems which have impeded the use of marginal cost pricing by water agencies. Notwithstanding the practical

problems associated with marginal cost pricing, prices continue to be considered efficient if “they are set equal to the long run marginal cost of water provision”. However, no instances of ‘pure’ long run marginal cost pricing has been found, in spite of this being the pricing policy of choice of many professionals and agencies. In some contexts selective marginal cost pricing is used as a demand management tool, but rarely accounted for the full social long-run marginal costs of supply.

Cost recovery policies need not include long-run variable costs in the volumetric part of the tariff, but only short term variable costs. There are several implications of pricing on the size or timing of future investments. Changes of pricing policy to rates at or above marginal cost often fail to consider the resulting impacts on new capacity requirements. In the context of high income inequality, such as found in some African countries, (marginal) cost based pricing is not recommended due to the regressive impact on income distribution associated with long-run marginal costs exceeding average historical cost.

There is no universally accepted definite ‘best method’ for determining costs. In addition, there remains a “grey area” between expenditures attributed to routine operation and maintenance and network rehabilitation. Furthermore, the subjective assessments of depreciation costs invariably lead to great underestimation. Charging for networked water services, however, faces an additional challenge: Ensuring a basic consistency between the ways to recover the costs of connection and the tariff is one of the most difficult problems.

The initial costs of connecting new users to the network can be equivalent to several months’, if not years’, worth of consumption charges. In view of the apparent neglect of the connection charge problem, tariff design (traditionally reflecting ongoing service charges) and connection charges (linked to the financing of network extensions and/or upgrades to accommodate new users) are discussed in turn. This is not to imply that tariffs exclusively cover operation and maintenance costs. In the context of pro-poor service design, latest thinking suggests that some measure of incorporation of connection costs into ongoing service charges would be beneficial to reduce the initial outlay for lower income customers.

In summary, once costs have been determined as accurately as possible, they need to be allocated between: (1) water supply, sewerage and drainage; (2) metered and unmetered customers; and (3) fixed standing charges and measured charges.

The following section will address questions (2) and (3).

## **7.3 Tariff design options**

### **7.3.1 Tariff structure**

Tariff structures can be described as a set of procedural rules used to determine the conditions of service and monthly bills for water users in various categories or classes. A tariff structure should allow service providers to comfortably recover operation and maintenance costs. It should further enable debt servicing and support development plans. Beyond this, tariff structures can be designed to achieve a number of social and environmental objectives. For instance, tariff structures can have a function of providing low lifeline rates for low

consumption and a penalty rate for high consumption. However, there is no international consensus on optimal tariff structures, and tariff setting practices vary widely.

In its simplest form, a water tariff is a *fixed monthly charge* levied on the customer. Alternatively, the user fee can be linked with *volumetric consumption*. *Multi-part tariffs* are obtained by combining fixed, volumetric and/or other charge components (such as annual charges based on property values or minimum usage fees). Metered (volumetric) water charges may be priced at a *uniform rate*, but there are a variety of *variable rates*. Most common is the *increasing block tariff* (IBT), with progressively increasing charges associated with a number of discrete blocks. Alternative options are *decreasing block tariffs* (DBTs), *mixed block tariffs* (MBTs) featuring a combination of the two, and *increasing block rates*. Similarly to the IBT, the increasing block rate is a progressive tariff structure, but whilst for IBTs the monthly user fee is calculated by applying the appropriate rate to water consumption in each block, monthly bills under an increasing block rate tariff are determined by total monthly consumption, according to which the applicable rate is selected and multiplied by total use in that particular month.

Water usage charges may be *differentiated* by type of user and may be adapted to reflect *seasonal variations* in supply and demand. Tariffs can be *varied within a service area* to reflect, for instance, administrative boundaries, pumping zones or historical precedent by including zoning differentials. *Contingency charges* may be included in response to droughts or other external events. Finally, *conservation payments* or credits may be provided in a tariff for customers demonstrating effective usage reduction. In many cases, tariffs will be a combination of these options. One challenge is the ‘correct’ allocation of costs between fixed standing charges and measured charges.

A move towards volumetric pricing is considered to be more efficient, as metering discourages the wasteful consumption patterns promoted by fixed charges. Metering has significant benefits, including providing customers with a sense of equity in that they pay according to their measured consumption. High fixed charges reduce customers’ ability to influence the size of their water bills, while low fixed charges create revenue uncertainty for water companies. Clearly the relative advantages of either option must be considered in each particular context.

A three-part tariff may be implemented for efficiency reasons. A three-part tariff envisages a consumption-related charge, accompanied with a connection charge related to the cost incurred by the supplier in relation to an individual’s decision to connect to the system, and a development charge covering the marginal cost of the distribution system. Connection charges related to the cost of the initial connection are discussed in detail in section 7.9. However, recurrent ‘connection costs’ are incurred by the supplier in order to maintain the system.

### **7.3.2 Examples of experience in Africa**

Like the majority of countries worldwide, many African countries have switched to increasing block tariffs in recent years. Table 7.1 presents a summary of tariff structure information extracted from the available literature on the subject.

Namibia has been cited as an example of successful cost recovery on the African continent. Since independence, Namibia has successfully eliminated deficits between running costs and supplier income. Water supply authorities have consistently collected a surplus, which in

1994/95 amounted to US\$0.08 per cubic metre. Bulk and customer tariffs reflect the scarcity value of water, while the tariff system provides cheap lifelines in support of economically disadvantaged households.

The remarkable achievements can be attributed to close supervision of local market developments. Water tariffs are reviewed on an annual basis and are subject to periodic adjustment. Decentralised decision-making may also contribute significantly: Block tariff bands are set in accordance with the particular circumstances of each town. Local councils determine the consumption bands and related unit costs, depending on local operating costs and the responsiveness of consumers to price incentives.

*Table 7.1 Tariff structures in operation in various African countries*

Country	Tariff Structure	Differentiation
Algeria	domestic: IBT (4 blocks) flat rate (others)	consumer groups: domestic, institutions, service enterprises, tourism regional differentiation under consideration
Benin	IBT	
Burkina Faso	IBT	
Botswana	IBT (4 blocks - 4 <sup>th</sup> band for peri-urban areas only, equals equivalent urban bulk rate)	area: major villages/rural villages/urban areas, urban areas further differentiated by supply areas business tariff under consideration
Cote d'Ivoire	IBT	uniform across the country
Ghana	IBT	
Guinea	IBT	
Kenya	IBT	
Madagascar	IBT (2 blocks)	consumer groups: small users, administration, special users
Morocco	IBT	
Namibia	fixed + volumetric, some IBT (4 blocks)	individual tariffs for each municipality special tariff for mining industry
Senegal	IBT	
Nigeria	flat rate (domestic) metered (industry & commerce)	several domestic customer categories (single tap - 1 family, single tap - multiple families, house with water system reticulation, high cost residential areas)
Sudan	flat rate MBR (3 blocks) for metered residences and industries	differentiated by size of property by region
Tanzania	uniform rate (volumetric)	consumer groups: domestic, institutions, commercial, industries, agriculture, expatriates
Tunisia	IBT (5 blocks), including wastewater component	consumer groups: domestic, standpipes, industry, tourism
Uganda	unmetered domestic: flat rate based on number of taps IBT (3 blocks): major industry & commerce uniform rate: all others (metered)	consumer groups: public standpipes, domestic, institutions, government, minor industry and commerce, major industry and commerce
Zambia	IBT	
Zimbabwe	fixed charge + volumetric rate	

Sources: Collignon (2002), Dinar & Subramanian (1997), Franceys & Gerlach (2008), Nyoni (1999), Plummer (2003)

A review of current pricing practice in countries for which cost recovery is yet a distant goal typically reveals the following picture:

- Large proportion of unmetered connections: The lack of incentives to conserve water leads to high costs for additional water supplies which are not usually matched with high-value uses.
- Large sizes of low-priced initial blocks in IBT structures distribute heavily subsidised water to the majority of households. Over-consumption leads to rationing, which in turn induces customers to invest in storage facilities and even the counter-productive use of suction pumps.
- Low average prices adversely affect quality and reliability of service and provide no financial incentives to utilities to expand into presently unconnected areas, leaving substantial minorities unserved.
- Shared connections in combination with IBTs, which were originally designed for exclusive use of a private connection by a single household, lead to affected poor households paying higher per unit costs than their middle and high income counterparts.

The following subsection discusses different charging options, paying particular regard to increasing block tariffs due to their prevalence in developing countries.

### 7.3.3 Performance of alternative charging options

**Flat fees:** Flat fees appear to be going out of fashion, and in many developing countries are only charged where connections are unmetered. Although they are often perceived as encouraging wastefulness, flat rates may be appropriate in circumstances where low consumption levels are combined with high costs of connecting to a network. Where they are used, they tend to be associated with mechanisms designed to better match likely water usage to the size of a customer's bill.

In England and Wales, for instance, flat rate water charges are based on rateable value of properties, and only two companies charge an undifferentiated flat rate fee. An African example would be the city of Kano in Nigeria, where attempts are made to align standard of living (as a proxy for likely customer income) with the applicable tariff rate (c.f. table above). Measures should be taken to induce "reasonable levels" of consumption, wherever flat fees are used. Flow restrictors, such as those installed in Durban, is one possible option.

**Volumetric charge:** The most commonly used form of volumetric (measured) charges is the increasing block tariff, which leaves scope to induce a range of distributive effects by adjusting the size and prices of tariff blocks. Successful implementation of an IBT hinges on (1) moderately priced higher blocks, which encourage large consumers to remain connected to networked services rather than seeking cheaper alternatives, and (2) a high connection rate, which reduces the likelihood of shared connections moving consumers into higher than necessary tariff blocks. These two factors are key to success.

The Namibian example demonstrates that steep block rates can be very effective in curbing excessive consumption. For instance, the city of Windhoek maintained constant demand levels in spite of population growth by 50%, by using steep block rates. *Increasing block tariffs (IBTs)* (originally devised to assist low-income households through below-cost first blocks without

introducing overall revenue distortions), do not necessarily increase the likelihood of households connecting to the system or encourage poor households' to use water. IBTs promote public health no more than uniform tariffs with built-in rebates, nor do they achieve equity or resource conservation.

In spite of their widespread popularity, IBTs penalise shared connections, which are commonly found amongst connected low-income households.

Where applicable, *rateable value* is seen as a socially equitable, though crude, basis for charging which is not recommended from a consumer perspective as it fails transparency and fairness tests. The UK experience shows that such a charging system gradually loses its relevance for economic efficiency as property values change over time and no longer accurately reflect the cost of providing water services to the household.

*Volumetric tariff structures* are commended for their inherent disincentives to consume at the margin and their simplicity. Decreasing block structures, however, are exposed as spectacular failures on environmental sustainability grounds and the social justice criterion, though it is conceded that economies of scale may justify the use of a DBT for reasons of economic efficiency. In the absence of “floating blocks”, i.e. boundaries that are sensitive to household size or other circumstances that necessitate high water consumption, rising block tariffs can be deemed a threat to household financial sustainability.

**Flat rate licence fees:** These do not meet conservation objectives, perform reasonably well in economic terms, but do not account for disparities in consumption and income. As volumetric consumption is the long run driver of new (and often expensive) development projects, flat rates can be criticised as they disregard long-run marginal costs. A *hybrid* system which combines a relatively high fixed standing charge with volumetric pricing could score moderately high on the three criteria.

**Council tax banding:** This links water service charges with the graduated local government tax, and is often presented as an option that makes some administrative, and economic, sense, with similar disincentives to conserve water as other non-volumetric charging systems. However, the success of such a charging system in terms of avoiding social regression much depends on any potential to adjust the banding system to apply a progressive taxation for water charges, so that more expensive properties paid more and less expensive properties paid less.

*Table 7.2 Performance of various tariff options against design objectives*

Tariff Structure	Cost Recovery	Objectives		Affordability
		Economic Efficiency	Equity	
<b>Fixed Charge</b>	<b>Adequate</b> Provides stable cash flow if set at appropriate level, but utility may be vulnerable to resale of water and spiralling consumption.	<b>Poor</b> Does not send a message the cost of use of additional water.	<b>Poor</b> People who use large quantities of water pay the same as those who use little.	<b>Adequate</b> If differentiated by ability to pay, but households are unable to reduce their bills by economizing on water use.
<b>Uniform Volumetric</b>	<b>Good</b> If set at appropriate	<b>Good</b> If set t or near	<b>Good</b> People pay	<b>Good</b> Can be differentiated

<b>Charge</b>	level, moreover revenues adjust automatically to changing consumption.	marginal cost of water.	according to how much they actually use.	by ability to pay, and people can limit their bills by reducing consumption.
<b>Increasing (rising) Block Tariff</b>	<i>Good</i> But only if the size and height of the blocks are well designed.	<i>Poor</i> Typically little water is actually sold at marginal cost.	<i>Poor</i> People do not pay according to the costs their water use imposes on the utility.	<i>Poor</i> Penalizes poor families with large households and/or shared connections.
<b>Decreasing Block Tariff</b>	<i>Good</i> But only if the size and height of the blocks are well designed.	<i>Poor</i> Typically little water is actually sold at marginal cost.	<i>Poor</i> People do not pay according to the costs their water use imposes on the utility.	<i>Poor</i> Penalizes poor families with low levels of consumption.

Source: Whittington et al. (2002)

## 7.4 Pricing differentials

There are three types of cost differences that may be reflected in water charging systems. **Spatial cost differences** (1) arise in response to variations in water resource availability, technology used, size of operations and/or population density and topography. Areas with low housing densities impose much higher per-capita distribution and collection costs on the system; likewise, ‘difficult-to serve’ areas tend to be more costly to serve.

Water supply services are also susceptible to seasonal demand variations, and other non-climatic factors influence short-term temporal variations (peak demand). However, there are no permanent operational examples of time-of-day tariffs. **Seasonal tariffs** (2) tend to be related to consumption rather than demand for access to a service.

**Customer differentiation** (3) is widely used throughout the developing and developed world. Most frequently, different charging levels apply to easily distinguishable groups, such as residential and industrial customers. This distinction is widely supported because consumption patterns vary significantly between these groups. In an effort to achieve greater equity, some countries have tried to further differentiate between customer groups. Indicators such as the number of taps and toilets within a dwelling, plot size and geographical location, or in the case of commercial customers the type of business activity, may be used.

Regional variations, though arguably more equitable and cost-reflective, are not supported in all contexts. A key advantage of the uniform tariff being applied across all towns and cities in a country is that it allows use of the lower unit operating costs in the large cities in such a way that surplus revenues generated in the large cities can be channelled into good service provision in secondary towns.

Customer differentiation in combination with an increasing block structure can yield quite complex tariff structures. For example, in the city of Jakarta, seven customer classes are recognised, ranging from 'K1' - social and worship facilities and public hydrants and 'K2' - very simple housing and water kiosks, to 'K4A' - luxury housing, medium businesses and government offices and 'K5' ports and shipping. However, customers find ways into 'cheaper' categories and the tariff structure is perceived as confusing, all the while failing to generate much-needed revenue for investment.

#### **7.4.1 Graded rates and group connections**

For group connections, a distinction can be made between graded rates for the group connections as such, and graded rates for members, but a fixed rate for the group as a whole. In the first case, the water utility charges different rates for group connections and private taps. Rates for the group connections may either be lower or higher than the rates for private taps. An example of a higher rate is that of a group connection shared by a minimum of 4 households at an individual household rate of 4 shillings. As a total the group would thus raise a minimum of 16 shillings. At the same time, a house connection owner might have to pay 10 shillings for the greater convenience of his private tap. In this way, sharing households pay a lower, and flat individual rate, but at the same time compensate the agency for their greater use of water as a group.

A higher private rate (e.g. 20 shillings) than the total water rate for a shared tap (e.g. 16 shillings) may be acceptable when private tap owners use large quantities of water in comparison with families who share a tap. The private tap owners may for instance also have installed washing and bathing facilities inside their house.

Flat rates for individual members within the groups have the same disadvantages as flat rates for house or yard connections. In addition, they are often a source of conflict between group members, since the members directly observe and experience differences in water use within the group.

Tap users' groups in low income urban areas in Malawi for instance had difficulty in functioning and stopped paying their water bills when conflicts occurred about water use. Members using the water only for domestic uses objected to others using the water for business purposes as well. Another issue to be resolved was the payment of a single charge by extended families, e.g. married children living with their parents or husbands with several wives. Also, poor households were using less water than the average agreed upon (6 buckets per household per day), because they had few containers.

Water utilities can stimulate groups to solve such problems by formulating a clear policy on equitable rates. They can also assist groups in decision-making on user rate systems and develop simple toolkits for graded water rates. The groups themselves often have sufficient knowledge about their members to make well-reasoned decisions about who should fall in which rate category. For example, a new system being considered in a project located in Malawi was to advise the tap users' groups to introduce two or three flat rates instead of one and classify their members in the different categories according to their water use and capacity to pay. The project was also advising the groups to count married children or second wives with children as a separate household, but to charge no higher rate when single families had more

than the average number of children. As part of the implementation, special training seminars for the groups, the tap committees and the water councils was to be undertaken at district level to which the groups can turn in case of serious internal conflicts.

#### **7.4.2 Productive use of water by individual households**

A system of graded water rates also makes it possible to charge for productive use of domestic water by individual households. Especially when benefits are substantial, there are strong reasons to charge a higher water rate from such households. Firstly, the more wealthy households often have more opportunities for productive uses: they have more cattle, land and so on than poorer households. If they use more water to make more money, it is only fair that they also should pay more for this water use (see Example 7.2). Secondly, there will be extra revenue for maintenance and repairs, and for expansion when water use increases beyond the capacity of the original scheme.

##### *Example 7.1 Flat water rates and the inequity effect*

The Banyudisi piped water supply in Java, Indonesia serves 640 families in 11 hamlets. Water is delivered through public standposts with adjoining cubicles for washing and bathing. All households pay a flat monthly rate of Rp. 50. Households which fill up a storage tank within their house pay another Rp. 50. Water is used both for domestic and productive purposes. The commonest productive use is for livestock.

A study of 81 households showed that most households with livestock belong to the high and medium income groups. The households with a high income together use nearly 4 times as much water for their livestock as the households in the lowest income group. Yet all pay the same flat rate.

Combination of domestic and productive uses of water has several benefits. Firstly, water for vegetable gardens or cattle can fit in with traditional water uses and local needs. It can also motivate households to take a house connection. The income from these productive uses can help to pay water rates. Motivation to maintain and repair the supply is higher, because breakdowns are not only inconvenient and a threat to health, but may also affect family income (see Example 7.2).

##### *Example 7.2 Productive water use to pay recurrent costs*

Pacul is one of the many communities in Guatemala in which a small piped water supply has been built. The projects started after a community request and a technical and socio-economic feasibility study. The community paid on average 40% of the construction costs in labour, local materials and loan instalments. After completion, the schemes were operated, maintained and managed by a local water committee.

Men and women also participate in setting the private or shared taps. In Pacul, construction was completed in little over one month. One and a half years later the system was still functioning without problems. But meanwhile, the community had built a second piped gravity system. Its water serves to grow strawberries for the urban market. With the extra income the committee hopes to pay off the two loans ahead of schedule and maintain both water supplies. Had the water agency realized this potential and designed a piped system for combined use, the construction costs would have been much lower.

The planning of an improved drinking water supply without consultation of the various user categories on their water needs has often resulted in supplies designed exclusively for domestic purposes. Failure to design domestic water supplies for desired economic uses has resulted in illegal use, water contamination, and shortage of water at peak hours and at the end of distribution networks. Serious problems have led to vandalism and conflicts.

Participation of local women in the planning and implementation of productive uses of water is important for two reasons. Firstly, many income-generating activities related to water are carried out by the women of the household. Secondly, women use income primarily for basic family needs, including the payment of water rates. Thus, in a project in Thailand, women used the increased availability of water and time for income raising activities in order to pay for the household's water connection.

### **7.4.3 Mixed systems: public standposts and private connections**

Another option to cover the recurrent costs of a community water scheme is to combine paid private connections with free (or flat rated) public standposts, the so-called mixed system. When there are enough private connections it becomes possible to finance the cost of public taps for the lowest income groups from a surplus of the rates paid by the private users. However, it is not always easy to get a good balance between free (or flat rated) public taps and paid private connections. Households which can afford to take a house connection do not always do so when there are enough free (or flat rated) standposts. Reduction of the number of standposts can stimulate more wealthy households to take paid house connections. However, it also reduces the access to a minimum service for those who cannot afford a private tap.

In some communities, where houses of low and high income families are not mixed or located too close together, it may also be possible to limit free (or flat rated) public standposts to the poorer neighbourhoods. The wealthier sections must then be helped to understand why, for reasons of public welfare, only private connections are made available to them. This can be combined with promotional activities to avoid the wealthier sections feeling discriminated against by not getting free (or flat rated) standposts.

## **7.5 Cost versus price: tariff levels**

While the tariff structure is an important tool to achieve water pricing objectives, it must be complemented by an appropriate choice of tariff levels. There is a real danger that water tariffs can fall short of meeting stated objectives by a long way, if tariffs charged by utilities are so low that there is no possibility of achieving price elasticity of demand.

Whilst it is well-known that low tariffs and consequently low revenues are the reason for many utilities' failure to provide adequate services or indeed to provide any service at all to a large proportion of the population, the Zambian case (Example 7.4) illustrates some other quite dramatic effects of failure to raise tariffs to the required level.

No matter how cleverly the tariff structure is designed, tariff levels ultimately prove to be the bottleneck. Interestingly, water tariffs have actually been falling in many of the countries

experiencing cost recovery problems. The reason most frequently cited for low tariff levels is the need to protect affordability for large numbers of low-income households. Subsidies frequently are the mechanism of choice to resolve conflicts between the interrelated aspects of cost, price and perceived affordability. A number of tariff structures, notably block tariffs, rely on in-built subsidy mechanisms to induce redistributive effects. Such cross-subsidies can be described as central to the principle of price discrimination.

*Example 7.4 Misguided ‘compensation’ for low tariff levels*

“As it was seen as impossible for councils to increase tariffs, the alternative mechanism for raising revenues was to opt for high levels of consumption. This had the effect of encouraging profligate use of water, which, when combined with lack of maintenance and plumbing installations (in some cases continuously running standpipes), resulted in some of the world’s highest levels of apparent water consumption. At one time in Zambia, per capita usage was estimated to be 3-4 times per capita levels in Europe, and 6 times those in West Africa.

Some measure of cross-subsidy is inherent in most charging systems, as users are never charged according to the exact cost they impose on a distribution system. As mentioned previously, cross-subsidies often support users in higher-cost locations. Frequently, industrial and/or commercial users are cross-subsidising the domestic sector, and cost recovery has been more easily achieved for these user categories.

Cross-subsidisation can be a powerful tool to promote household connections for low- and middle-income families. The high connection rate achieved in cities such as Abidjan (Cote d’Ivoire, which at 10 household connections per 100 inhabitants is higher than anywhere else in sub-Saharan Africa with the exception of South Africa), is mainly due to a pricing policy firmly rooted in the principle of cross-subsidy. However, subsidy payments in the form of direct transfers to customers are generally favoured as the best solution (economically) with cross-subsidies rated second-best.

## **7.6 Charging industrial customers**

Water pricing experience relating to industrial and/or commercial customers suggests that cost recovery has been achieved or approached for this customer category. Indeed, many pricing strategies rely on heavy cross-subsidisation from industrial to residential consumers.

This is not necessarily good practice for developing economies. The loss in efficiency caused by charging industrial customers higher than marginal cost prices may not be serious if the price elasticity of demand for industrial and commercial water is particularly low, as indeed it may well be. However, considering that the industries in developing economies have to compete in international markets (for export or input substitution), the high water (and other utility) charges may negatively affect their ability to compete. Hence, while cross-subsidising domestic customers with revenue from industrial and commercial customers, care should be taken not to unduly undermine the competitiveness of the industrial and commercial that is the engine of growth for the economy.

## 7.7 Reconciling cost recovery and affordability objectives

Many countries now embrace the user pays principle, with the ultimate objective of full cost recovery. Some countries aim to provide some level of assistance to individual households with difficulties in meeting payments for water charges. Eligibility can be tied to income, age, occupational groups. Many developing countries tend to adopt low “lifeline” or social tariffs, which have been criticised as indiscriminate subsidisation of all users, irrespective of need. Targeting is said to be a good thing, but how to achieve it remains a challenge.

Policy responses and practical measures designed to balance household affordability and full cost recovery objectives can be divided into the two categories of (i) income support mechanisms and (ii) tariff adjustment and innovation (Table 7.3). Income support measures address water affordability problems at an individual level, and may have to be decided on a case by case basis. Their advantage lies in their neutrality with respect to the economic and environmental signals sent to customers via water billing and marginal pricing. They are open to the criticism, however, that income redistribution is not a function of a water provider. Tariff-related measures, usually in combination with some form of subsidy, are directly related to water bills, and are favoured where governments are either unwilling or unable to assist households for whom water charges are a financial burden.

*Table 7.3 Income support measures and tariff-related measures to support affordability encountered in a recent OECD survey*

<b>Income support measures</b>	<ul style="list-style-type: none"> <li>▪ Direct income assistance or water service vouchers from government, water utilities, or other private and charitable sources</li> <li>▪ Capped tariff rebates and discounts, giving rise to reductions in charges of a predetermined amount</li> <li>▪ Payment assistance in the form of easier payment plans, special loan facilities, and arrears forgiveness</li> <li>▪ Other hardship initiatives providing assistance directly to households</li> </ul>
<b>Tariff-related measures</b>	<ul style="list-style-type: none"> <li>▪ Using subsidies to “manage” utility prices by keeping them lower than they would be at full cost recovery</li> <li>▪ Designing tariff structures and fixing tariff levels to influence or perpetuate the extent of cross-subsidisation, either of households by other sectors or of low-income households by the rest of the household sector, by introducing or refining increasing block tariffs or by allowing tariff choice. Sometimes known as “social tariffs”.</li> <li>▪ Capping metered tariffs for low-income consumers.</li> <li>▪ Designing special (or “social”) tariffs that are restricted to designated groups, such as low-income households.</li> <li>▪ Using special demand management programmes that target low-income households (thus helping to reduce quantity rather than price)</li> </ul>

Source: OECD (2003)

### 7.7.1 Lifelines and social tariffs

Many tariff structures include a highly subsidized or even free initial consumption block targeted to low-income consumers. There is a wide variation of social or so-called ‘lifeline’ blocks: a ‘social rate’ can be applied to the water bill for, say, the first 3 to 10m<sup>3</sup> per month. Where there are numerous industrial and commercial customers as a proportion of domestic customers, a certain amount, say 6m<sup>3</sup> per month, can be provided free to all domestic consumers.

In higher-income countries, where households tend to have fewer members, there are fears that lifeline services encourage excessive consumption, thus encouraging over-investment in infrastructure. Developing economies face different problems with lifeline design. In Africa, social blocks tend to fail to achieve their objective as many of the poorest either do not have access to a connection, share connections and/or obtain supply through on-selling by households with a private connection leading to consumption beyond the lifeline level. The lifeline allowance should not be so generous that wealthier households receive the full benefit of the subsidy and demand management becomes largely ineffective.

### **7.7.2 Flanders-type tariffs**

A modified version of a lifeline was introduced in the Flanders region of Belgium. Each household is entitled to receive the first 15m<sup>3</sup> per person per annum (equivalent to 41 litres per capita per day) free of charge. This unique approach, moving beyond the traditional per household (or in fact, per connection) allowances, is an example of a floating block tariff, under which the effects of a rising tariff are felt at levels that vary in accordance with household characteristics. It is argued that the Flanders allowance is small enough to ensure that very few households will face a zero price for their water, politically defensible, in that it covers a certain core of basic (essential) water use in the home, and equitable, especially between households of different sizes.

The Flanders-type tariffs require an official or quasi-official record of household members - in Belgium tariff administration is facilitated by an annual register of residents within each household - the introduction of which might prove politically and socially contentious. While this may be a valid concern in some circumstances, developing countries with high population fluctuations in urban areas and possibly large numbers of unregistered residents living in informal settlements would find this type of concessionary tariff wholly impractical.

The high social score of a floating tariff is commendable, but it has negative impacts on the service provider's revenues. Furthermore, there is an inherent weakness in that the free consumption block is unrelated to needs, so that subsidisation occurs across all income levels.

### **7.7.3 Means-tested subsidy mechanisms**

Ideally, therefore, tariff concessions would be exclusively reserved for low-income and/or vulnerable groups. Successful achievement of cost-reflective tariff levels without compromising the government's social and distributional goals can only be achieved where there is effective targeting of deserving households.

An output-based subsidy mechanism covering a share of water bills for eligible households can be implemented to shield the vulnerable households when tariffs are rising rapidly. The subsidy is paid directly to service providers. In this case, water bills for, say, the first 15m<sup>3</sup> consumed each month are effectively shared between government and households, with a certain percentage qualifying for the subsidy. Consumption beyond the subsidy level would incur the full tariff, and a household contribution is maintained to encourage good payment habits.

Under subsidy schemes, eligibility is determined based on a score awarded following a personal interview within the applicant's home which verifies socio-economic circumstances, and which

remains valid for, say, up to three years. The complexity of a targeted subsidy mechanism, and in particular the high level of institutional capacity required for its administration, may render it impractical in many developing countries. Simpler targeting mechanisms, such as poverty mapping is also an alternative.

## 7.8 Sewerage charges

Much like water tariffs, user charges for centralised sewerage systems can comprise a combination of fixed and variable components. Sewerage charges play a major role in curbing harmful discharges of industrial wastewater into the environment, and the relative importance of this consideration can be expected to be very high in many developing economies as - with a few exceptions - domestic connection rates to public sewerage systems is generally low. An appropriate tariff level is crucial, as disposal costs via the public sewers are weighed against the cost of (pre-) treatment carried out by industrial customers. As firms seek to minimise their overall costs, decisions regarding effluent treatment are made in direct response to the level of sewerage charges, which has important consequences for public investment in treatment plants. Excessively high sewerage charges heighten the potential for illegal discharge of polluting wastewater.

## 7.9 Connection charges

Connection charges are upfront charges that customers have to pay before getting connected to the water and sanitation system. In the context of extending coverage, the cost of new customer connections is an important consideration. There is a direct link between connection charges and water pricing, with the problem of connection charge barriers to water services for poor urban households being increasingly recognised. The level of connection charges in tariff design and water pricing can determine access to water and sanitation services especially for the urban poor in low and middle-income countries.

It should be acknowledged that up-front charges can be a barrier to entry for poor householders. It should be realised that even extremely affordable water tariffs can end up only benefiting households already connected to the water supply system, if connection charges are unaffordable. Progressive water utilities make it relatively easy to obtain a water connection by charging a nominal amount, then recover the costs of connection over time through water bills.

### 7.9.1 The cost of connecting

There is often considerable disparity between connection charges and the incomes of poor urban households, and this is evident by comparing connection costs with the average GDP. Connection charges, which can amount to several months GDP, put household water connections completely out of reach of the average low-income household with an income of significantly less than average GDP.

Recent research in Africa show that the total acquisition costs for a private water connection can range from 1 up to 12 months' per-capita income. High initial charges for a new connection

can take a variety of forms, such as a non-returnable security deposit, a connection fee charged at a fixed rate or according to the length of newly-laid pipe, meter costs, administration fees or infrastructure development charges related to the additional system capacity required.

Recent research findings map the long-winded and complex connection process faced by low-income households wishing to connect to networked water services. Typically, the process involves a variety of formal and informal payments made to local authorities, landlords and contractors, such as application fees, payments for required approval letters (e.g. letters of consent from landlords or owners of existing service lines and authorisation for road crossing), connection fee and related administrative fees, survey fees, material and labour costs, inspection fees and road-cutting charges. Informal payments, without which the connection process can suffer significant delays, may be due at several stages, along with ‘compensation’ for staff, labourers and inspectors. There are high opportunity costs of repeated visits to offices and additional transport and other expenses that make the process of getting a new water connection really expensive.

### **7.9.2 Cost of providing connections**

The costs involved on the provider side include connection costs, distribution and/or development costs and the costs of increasing productive capacity. Two types of connection costs can be distinguished. First, there is the infrastructure cost which includes the material and labour costs of extending the network, recurrent maintenance, metering equipment, and even the costs of billing customers that can be directly attributable to newly connected users. All of these costs are related to an individual consumer’s decision to connect to the service, but do not vary with the amount of water consumed. There is also the cost to the service provider which may be described as a requirement of readiness to serve whatever the amount of the service the customer demands. This means that it may be necessary to invest in productive capacity to match the number and type of connections.

Engineering practice manuals recommend that the discrete elements in both water supply and sewerage projects can and should be financed by the direct beneficiaries. The costs of residential plumbing and house connection to the street water should be borne by the householder. The costs of the street main sewer can be charged to the abutting properties on the basis of the front footage.

In contrast to the costs incurred by connecting new customers stand considerable costs to the utilities of *not* addressing the problem of large numbers of un-served households. There are considerable financial losses that can be attributed to illegal connections, often performed by corrupt utility staff, exploiting the impatience of new customers wishing to avoid the lengthy connection process. Where there are inefficiencies in handling new connections, unofficial connection fees can be more than double the official connection fee. In many urban areas, rent-extracting behaviour of distributing vendors, public tap operators and water utility staff is the primary reason for the low numbers of household connections and public taps.

### **7.9.3 Charging for new connections**

Connection charges allocate a share of the cost of expanding existing facilities or constructing new facilities to new customers joining a water network. As the cost of increasing system

capacity is directly related to water demand, it could be argued that charges should be raised in line with the projected 'burden' a customer places on the system. There are different ways of appropriating the various cost elements in user charges, including connection fees.

One way is to set the price of public services to equal the marginal cost of providing it, taking the view that tariffs should be all-inclusive in order that resources are allocated efficiently. Beneficiaries with the option to hook up to water service by way of an area trunk-line could pay (a) an area-specific property tax or development charge, designed to recoup the cost of trunk-line construction and other system-wide capital costs; (b) a recurrent monthly fee to cover the costs of access - the connection from the trunk-line to individual properties, as well as metering and billing; and (c) a water-use charge related to actual consumption to cover the marginal cost of supplying water to the user.

The following three principles can be used to determine an appropriate connection charge (based on practice in electrification services in developing countries):

1. Only the individualised portion of the costs should be allocated outside the tariff, bearing in mind that the value of the connection will be associated with the building rather than the customer, to whom the connection is worthless upon leaving.
2. Increased costs associated with contracting out should not be reflected in the utility's billing to the customer.
3. To some extent it will be inevitable to level connection charges as the location of new applicants is not necessarily determined by choice. It may then be necessary to consider different technical options in order to achieve a somewhat near adequate coverage of expenditures.

If the second principle proves impossible to adhere to, connection charges can be incorporated into ongoing tariffs. A marginal expansion cost calculation can allocate a connection fee to all new customers whilst the remainder of the connection cost (reflecting the increase in demand) is shared across the entire customer base.

#### **7.9.4 Development charges**

System development charges are an important means of allocating a fair proportion of the cost of new or existing infrastructure onto customers wishing to join the system. A development fee effectively allows new users to pay for their share of a water supply system that had been designed to compensate for additional (future) demands on its capacity. To ensure that the fee is shared out amongst all property owners, it would have to be absorbed into higher land costs for property buyers, or else it would have to be retrieved through direct payments if and when purchases are made.

If the development charge were collected as part of the connection fee, it may adversely affect the connection decision. Development charges should be levied on all property owners at the time the network is built. Development or access charges incurred during the installation of the network may be considered to vary according to such factors as population density and geology. However, the economic efficiency criterion suggests that this connection charge should not be used to recover general system development costs, because connection charges refer to the non-recurring and normally up-front charges levied on new customers, which differ from other (recurring) fixed charges.

### 7.9.5 Lump-sum connection charges

A standard fixed charge would be preferable from an administrative point of view, if the point of connection is within a certain distance of the main distribution system. The guiding principle for determining appropriate charges should be cost recovery.

Where costs are directly related to the capital cost of installation, a lump-sum connection charge is appropriate. Connection fees may refer to both a lump-sum connection charge and a periodic fixed payment. The lump-sum connection charge may be determined according to the size of the connection or type of consumer; the periodic fixed payment is determined by consumer characteristics related or unrelated to, but not varying directly with, water use.

Fixed monthly fees have been used widely but are often supplemented by other fees such as meter rental fees. Fixed fees may vary according to meter size, pipe diameter or property value. Lump-sum connection fees consist of a flat charge based on the cost of installation.

As might be expected (because of the social welfare value of water) it is generally seen that industrial and commercial customers pay higher connection fees than domestic users. From an efficiency standpoint, costs relating to network extension should be charged to each connection as a fixed periodic fee.

## 7.10 Approaches to connecting low-income households

If the connection charge barrier is not addressed, extremely high connection charges can undermine any policy intended to connect the poor. Suggested practical reforms to the present practice of charging initial connection fees include:

- abolition of infrastructure charges and deposits (retaining the connection charge)
- offering discounted connection charges to legalise connections;
- applying fixed rate connection charges irrespective of cost involved;
- offering discounts in exchange for households contributing labour to new installations;
- facilitating repayment through instalment plans or micro credit options;
- clearly establishing ownership of the meter (with the utility) to avoid removal or tampering; and
- establishing quality assurance mechanisms to guarantee the quality of the connection itself.

### 7.10.1 Lowering the cost of connection

An upper limit for connection fees analogous to the 5% of household income rule of thumb is generally accepted as appropriate threshold for water bills.

Meanwhile there is evidence that utilities have successfully lowered the cost of connecting to the network by experimenting with simpler, innovative technologies and using creative technical designs. In some locations, water supply costs could be reduced simply by lowering the design capacity of the system from, say, 150 litres per capita per day (lpcd) to 120 lpcd. Low-cost sewerage systems can be built using the condominium approach developed in the early 1980s.

This approach was successfully replicated in El Alto, where the private company Aguas del Illimani connected nearly 3000 households for approximately half the price of a conventional system. Connection costs were reduced from US\$229 to US\$112 for water supply and US\$276 to US\$142 for sewerage. Routing sewer lines through private plots or underneath sidewalks eliminated some of the cost for materials and labour, and further reductions were offered in return for labour contributions from the communities.

Similar experiences were reported from pilot projects in Buenos Aires, where community groups receive reduced connection charges in exchange for trench digging and pipe installation work under the supervision of company engineers. Here it was found that the popular approach of labour exchange worked best in smaller communities of up to 2500 residents, but was less practical in larger communities, where complex and expensive capital investments are required.

In some cities, authorities attempt to differentiate connection charges based on the plot size of the house to be connected. In the city of Hyderabad, where plot sizes of up to 100m<sup>2</sup> are liable for US\$ 19.15, compared with US\$ 74.47 for 100 - 200m<sup>2</sup> plots and a staggering US\$ 340.43 for plots of greater than 500m<sup>2</sup>, this can be viewed as an effort to target subsidies to the poorest households, which presumably own the least land.

### **7.10.2 Facilitating payment**

From an examination of the effectiveness of cross-subsidies, it can be concluded that subsidies should be used to facilitate access for the poor. High connection fees should either be abolished, incorporating them into volumetric water charges, or long-term financing options made available in order to end the ongoing discrimination against the poor. Tariff policies should be reformed, to give customers the option to repay connection fees over a number of years. Bundling connection fees with tariffs would avoid the need for households to secure micro-credit to finance a connection, and development loans for new systems could include connection costs as part of the overall loan package. The top priority of eliminating the access barrier should go hand in hand with a general tariff increase, which in turn would fund the development of new water supplies.

Credit facilities could be extended to households by either the supplier or alternative financing agencies. Where credit is granted by the utility, this could be repaid in two ways - as a standing charge on top of the monthly consumption bill, or as a special 'tax'. The latter is described as a levy proportional to the volume consumed, to be paid over an agreed period of time or until the costs of connection have been repaid.

To ease the financial impact on low-income households, loan packages should be offered to assist with connection charge payments. It is suggested that connection charge loans may then be included in regular user charges (i.e. tariffs) and repaid in instalments. It is acknowledged that even with available targeted loans, some low-income households may not be able to afford a water connection. Group connections would then prove a viable option as this allows full cost recovery of connection and water supply whilst sharing the financial burden between several households. This option prevents introducing a divide between poorer households, who cannot afford an individual connection and who would then have to rely on sometimes not very easily

accessible public standpipes, and wealthier households, whose willingness to pay might in turn be affected in the light of freely available water from standpipes.

Household level credit is, however, more expensive, and there is evidence that credit facilities for connection charges are being offered and have worked in various places. Water companies can recover material costs of connection via monthly fees, which can be collected in addition to tariffs. The cooperation of local banks can be enlisted, and loans made available to households through a local microfinance institution on the condition that the household was in good financial standing, able to produce evidence of an adequate income and guarantees. Households can be provided with an interest-free loan from the municipality, which is then repaid over a five-year period.

Micro-credit schemes have also successfully supported connection programmes. It is worth noting that financial assistance for water connections is not necessarily a ‘poor countries’ phenomenon’. In the US state of Ohio, for instance, support takes the form of “a 0% interest deferred or a low interest loan (3%) for the costs associated with the connection to the City of Columbus water supply”. There are strict eligibility criteria, such that the programme normally targets families earning no more than 80% of area median income. Property taxes and any other loans granted by the municipality must be current and applicants must provide proof of having arranged payment plans with the county auditor.

### **7.10.3 Experience in African countries**

Social connection programmes have been implemented in the capital cities of Senegal and Côte d’Ivoire. In both locations, cheap social connections are offered to promote the official policy of providing household connections for all, saving US\$200 on the cost of an ordinary connection whilst providing identical service. The programmes aim to support lower-income applicants, but the eligibility criterion requiring property ownership and land title casts doubt upon the accuracy of targeting. Applicants in Senegal must reside within 20 metres of the nearest main (or within 100m in the case of a group connection for 4+ houses) and are charged a security deposit of US\$19 against future consumption charges.

The internal funding mechanism used in the case of Abidjan, Côte d’Ivoire, is commendable; the difference between the actual cost of making the connection (US\$150) and the US\$40 connection fee is financed by a Water Development Fund (WDF). The Fund distributes finance obtained through a surtax on water bills. Customers have thus financed primary investments in the water sector since the introduction of the National Water Fund tax, with the main contributions coming from “normal” and “industrial” tariff bands. About 40% of the funds distributed via the WDF go towards subsidising new connections.

Eliminating reliance on external funding assistance can improve targeting. Social water connections do not always serve the poorest households, as these do not tend to live in the stable and organised communities targeted by the programmes, nor do they serve only the poor. There are other instances where connection subsidies are captured by non-poor households.

## 7.11 Tariff implementation issues

### 7.11.1 Predicting cost recovery outcomes

Access to information about the social and institutional context, service infrastructure and prevalent billing and payment practices allow prediction of cost recovery outcomes to a reasonable degree of accuracy. Payment rate (the percentage of customers paying bills on time) and debt ratio (current v. total debt including arrears) can be taken as proxy indicators for the likelihood of successful cost recovery given that reliable information regarding actual cost of service provision is not readily available. The combined data captures financial implications of household behaviour, and this is easier to extract than actual collection rates.

The number of consumers, including whether or not they have a private connection and the extent of metering, are considered as relevant (and obtainable) input variables on the infrastructure side. Billing and payment indicators are those perceived as conducive to improved cost recovery: severity of penalties for non-payment, progressive tariff structure, rewards for high payment rates in the form of improved local services, and provision of payment facilities at supermarkets as a measure of convenience. Demographic profiles, including poverty incidence, are used as context variables, but other causal factors, such as managerial capacity at the municipal level, had to be omitted due to data limitations.

The empirical results show that although contextual factors have some influence, cost recovery outcomes are most susceptible to other factors which are within the remit of municipal decision-making. A high proportion of private (metered) connections and swift punishment of defaulters by service restriction are presented as the recipe for success. Campaigns and accessible payment facilities for lower income customers were found to affect lower than average users most heavily, such that the overall financial benefit was reduced.

### 7.11.2 Metering

The benefits of water metering as an incentive mechanism to voluntarily reduce consumption, thus avoiding non-price demand rationing (e.g. scheduled or unplanned service interruptions), are clear in water scarce environments where at least seasonal shortages are to be expected. Universal metering, which is a prerequisite for any volumetric pricing strategy, has often been questioned on the basis of whether or not it makes economic sense. The cost of a water meter and any associated costs (installation, meter reading, administrative cost) must be weighed against the expected savings in production costs. Accurate predictions of the anticipated reduction in consumption are crucial in cost benefit calculations. Favourable outcomes are most likely where water charges are set at a higher level.

Recommendations to achieve a 'socially optimal number of meters' (defined as selective metering of consumption where metering induces an increase in welfare) have been made. Computations, which account for metering costs not normally included in the definition of marginal costs, show that optimal volumetric charges coincide with marginal cost pricing in all circumstances. Selective metering proves preferable to universal metering, but in situations where there are doubts about institutional capacities and integrity, decentralised introduction of metering, whereby providers and users reach the socially efficient outcome because regulation forces company and users to bargain over compensations for any loss in consumer

surplus, is recommended. The prerequisite incentive mechanism “can be easily implemented by giving the user the property right over the charging regime and at the same time giving him the ability to sell that right to the Water Company in exchange of a payment or compensation.”

The excellent demand management properties of metering may prove to be a downside in some circumstances. Rather than encouraging the voluntary restriction of water consumption, it may be in the best interest of developing economies to stimulate economic growth through increased water use. It may also be useful to note that apartments do not need to be metered individually, though apartment buildings usually are. It can be argued that in pursuit of equity and efficiency objectives individual meters should be installed. Apartment blocks are widespread in many African countries, where the same argument would apply and higher administrative costs would have a significant impact, particularly for low-income tenants.

Experience shows that the ease of transition to the new metered billing system is an important social consideration. In some countries, the switch to volumetric charging has initially been voluntary, with customers being allowed to choose between tariff options. The example in the box summarises some of the concerns that have been raised in regard of the impact of metering on social justice:

*Example 7.5 Social concerns about metered water supply*

“Opposition to universal metering has mainly come from those concerned with the impact of this charging method on those with low incomes. Because the costs of funding the introduction of universal metering are high, it is assumed that the costs of any programme to do so would be borne by consumers and would result in higher charges, both to fund the installation of meters and to pay for their running costs.

Furthermore, it is also assumed that the tariffs associated with metering would be set at a rate that would penalise people who were heavy domestic users of water. These people would not just be those who can afford to pay more (for example, some swimming pool owners) but would include large families and people who use a lot of water.”

The conditions under which universal metering is most likely to be appropriate and beneficial in a developing country context include:

- high incremental cost of serving new customers with new water resources, such that high payoffs can be expected from balancing supply and demand,
- good water quality and adequate and continuous mains pressure, and
- variable consumption pattern, such that equity concerns require rebalancing of payments.

It should be noted that under falling demand scenarios, metering is least likely to be appropriate.

However, a much greater obstacle to cost recovery under a metered charging regime may be low meter penetration, as in some developing countries. Metering coverage is as low as 32% in some parts of the capital cities. In peri-urban areas, the number of connections with functional and well-serviced meters can be as low as less than 1%. In spite of high unaccounted for water ratios, utilities are often reluctant to improve metering coverage.

### **7.11.3 Billing, collection and debt recovery**

Another consideration in choosing an appropriate charging structure is the administrative effort required to collect operator revenues. There are high costs in terms of installing, maintaining and reading meters, processing the meter readings and distributing bills.

However, metering and associated costs are not the only concern. Many cases of lost revenue are related to non-payment and debt recovery. For instance, problems of debt collection from domestic customers can be hampered by a lack of legal clarity. Although disconnection for reasons of non-payment is permitted in several countries, suppliers may lack legal authority and capacity to recover bad debts, manual processing of records significantly delaying the process. Naturally, this is exploited by customers who connect with no intention to pay. Furthermore, incentives to collect debts are reduced as government allocations cover operation and maintenance expenditures. High prevalence of non-payment on the part of government departments, who cannot be disconnected, only serves to amplify revenue collection problems.

Yet in some countries, water disconnection is outlawed on the grounds that it would deprive the household of a vital good. Instead, an alternative and apparently effective means of enforcing water charges has been developed: Enforcement is arranged via disconnection of electricity supplies until debts on the water account are cleared. In other countries, water providers experience severe delays in revenue collection due to a culture of delaying payments: People who do pay may wait months or even years after receiving the bill before remitting payments. Increased efforts to identify water users, supported by the introduction of a computerised billing system and the elimination of illegal users, are positively reflected in higher collection rates: Reforms undertaken in some countries have resulted in water utilities raising their revenue collections up to threefold during the first year of operation.

### **7.11.4 Pre-payment**

The introduction of pre-payment technologies has been proposed as a path to cost recovery that would simultaneously reduce non-payment and indebtedness. Pre-payment devices dispense either a predetermined volume of water or allow withdrawal for a limited time period. An alternative option is pre-payment credit, advance payment for future water consumption. Pre-payment technologies have been used in South Africa to provide an allowance of 200 litres per day to households.

However, pre-payment systems have attracted sharp criticism in several parts of the world. There are alleged links between cholera outbreaks in the South African province KwaZulu-Natal with the replacement of traditional standpipe service by communal taps fitted with prepaid meters. It has been stated that high upfront connections fees and user charges drove households to resort to traditional, contaminated water sources. African countries other than South Africa where pre-payment is reportedly in operation are Namibia, Swaziland, Tanzania and Nigeria. In some of these countries, the technology has been said to be expensive to maintain.

## 7.12 Economic regulation

Worldwide experience shows that the strength of the regulatory system has a significant impact on the success of water pricing strategies. The design of appropriate tariff systems is a critical regulatory task, which goes hand in hand with subsidy allocation. Efficiency and cost reduction are the major objectives of regulation. In the absence of information asymmetries, economic regulation would be a simple matter of calculating optimal prices, determining cost reductions to be achieved by a firm and issuing instructions to this effect. This statement implicitly underlines the crucial role information plays in the regulatory process as recognised by the New Regulatory Economics. Due to their informational advantages over regulators, firms have to be given incentives to reveal their efficiency potential and implement cost reductions.

The key design issue for incentive regulatory systems lies in achieving the right balance between incentives and the distribution of efficiency gains, or profit, between shareholders and customers. There are relative advantages of the two available alternatives, rate of return regulation ('cost-plus pricing') and price capping. The degree to which a water utility company will be compelled to improve long-run efficiency is determined by the rewards offered. As with a fixed rate of return a utility benefits little from improved efficiency, rate of return regulation is considered a low-powered incentive mechanism.

RPI-X, the best-known variant of the price cap which has become the most distinctive feature of British utility regulation, provides higher-powered incentives for outperforming efficiency targets. Efficiency gains are retained as economic profit by the utility for a certain period of time and passed on to customers at regular price reviews, when price controls are set for the next regulatory period. This 'regulatory lag' is described as the key feature distinguishing RPI-X from rate of return regulation.

When it was first introduced, RPI-X was perceived as the superior alternative due to its greater inherent cost efficiency incentives and operational simplicity. After two decades of RPI-X regulation, it has proven more complex and problematic than anticipated. Rather than being gradually replaced by the introduction of competition as expected it had to be supplemented with quality controls. For all its successes, RPI-X has not completely eliminated the regulatory risk.

Regulators not only face the challenge of balancing competing objectives in developing tariff structures, but also may not be empowered to take the necessary steps to adjust tariff structures and levels in line with requirements. The tariff setting authority frequently remains vested in political hands. Even where no dedicated regulatory agencies are in place, ultimate tariff decisions are often confined to the highest political ranks.

Regulators also have only limited control over subsidy levels. However, the choice of regulatory system (i.e. price cap or rate of return regulation) influences the choice of technology and hence the level of investment (and hence subsidy) likely to be required. International regulatory best practice indicates that given a clear legal mandate to take on social responsibilities and a pro-poor regulatory framework, economic regulators can have significant impact on balancing economic and social objectives.

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## 9 ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AWF	African Water Facility
AWF	African Water Facility
AWV	Africa Water Vision and the Framework for Action (FFA),
CapManex	Capital Maintenance Charges/Expenditure
CGP	Country Governance Profile
CPIA	Country Policy and Institutional Assessment
DBT	Decreasing block tariffs
GDI	Gross Domestic Income
GDP	Gross Domestic Product
IBT	Increasing block tariff
IWRM	Integrated Water Resources Management
IWRM	Water Resources Management Policy
Lpcd	Litres per capita per day
LRMC	Long run marginal cost
MBTs	Mixed block tariffs
MDG	Millennium Development Goals
NEPAD	New Partnership for Africa's Development
O&MM	Operations and Minor Maintenance
OECD	Organisation for Economic Co-operation and Development
Opex	Operating and Minor Maintenance Expenditure
RMC	Regional Member Country (of the African Development Bank Group)
RMCs	Regional Member Countries
SSA	Sub-Saharan Africa
WACC	Weighted average cost of capital
Watsan	Water and Sanitation