FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF WATER AND ENERGY

NATIONAL GUIDELINE

FOR

URBAN WATER UTILITIES TARIFF SETTING

MARCH 2013

Table of Content

Page

1. Introduction ……..... 2

2. Water Tariff Setting …… 5

2.1 Background..... 5

2.2 Tariff Objective …….. 8

2.3 Tariff setting Methodologies …… 10

2.4. Guideline for setting water tariff …… 15

2.4.1 Setting Water tariff blocks ……..... 19

2.4.2 Setting Water tariffs ……..... 21

3. Annexes ……... 34

1. Introduction

Town water supply service is principally a natural monopoly where only one supplier per town provides the service. Thus since there is no competition water supply service would be inclined to charge high monopoly prices and lack an incentive to become more efficient if left to itself. Therefore, it is the task of the regulator to set tariff which cover the necessary costs for sustainable service provision of the service, on one hand and protect the consumers from unfair charges on the other hand as well as ensure that a certain minimum quantity of water is affordable to all including the very low income people.

Therefore, any water tariff setting endeavor should take into account the special situation of the low income community, the ownership of assets, responsibility for operation and maintenance, the level of service and the willingness and ability to pay. This suggests that there may be a need for a special tariff setting process to be applied for low-income communities. Hence, in the tariff policy decisions has to be made about cost recovery, cross subsidy within the water supply service area of operations and future investment. This should be done with full transparency to maximize community and political commitment to the tariffs applied.

Subsidies are needed to assure that the poor have access to reliable water which leads to a system of cross-subsidy. Cross subsidies are needed to be provided to consumers who use public fountains and for domestic connections for basic needs. This will ensure that water is affordable for most of the urban poor, the majority of whom depend on public fountains, for their basic needs at affordable rate. It means the water supply service charges low-income domestic users below-average rates, but charges the nondomestic uses at above-average rates to make up the difference.

But there must be a limit to the cross subsidy. If the water supply service continually increases prices for nondomestic users to make up the shortfall of revenues from domestic users, it may drive some of its customers to terminate their agreement and obtain water supply services through other means (e.g., private bore wells) and the water supply service will then face with the challenge of providing subsidized service to a larger percentage of its domestic customers. In the long run, this situation can threaten the service's efforts to move toward financial self-sufficiency, as well as its ability to expand coverage to un served households. Thus, subsidies should be limited to the poor and the level should be based on willingness to pay surveys.

In Ethiopia many water supply services are operating with varying and very low tariff structures despite the rising levels of inflation witnessed over the years. As a result cost coverage has remained very low which has greatly constrained service provision due to inefficient operations and limited investments in system expansion and maintenance. In addition, the low cost recoveries have a negative impact on the poorest population, many of whom lack adequate access to water supply and are

forced to use expensive and unreliable water sources for their domestic needs. The health and socio-economic consequences have been also immense.

Thus, developing a better tariff that enables the town water supply services to become financially viable is very critical, now a days, for most of the water supply services to operate smoothly. The tariffs to be set for the water supply services therefore, should be that which enable the utility to achieve full cost recovery and meet most of its short, medium and long-term investments and operating and maintenance costs, while at the same time ensuring increased coverage and quality of service.

Town Water Supply Services in Ethiopia, study and submit its tariff proposal to the town water boards if an adjustment of tariff is intended. Based on an analysis of cost level and structure as well as performance and efficiency of the water supply service in service provision, new tariffs will be checked by the town water boards, in consultation with the regional water bureau, and submit to Woreda/ City Council for approval. The council approves the tariff if it believes the tariff is affordable for the town community.

Within this framework town water boards, as a supervisory body in the town, has the responsibility to enable the water supply service to operate on a sustainable basis, protect the consumers from being overcharged and ensure the access to the services for the poor. Thus, the board could support the increase of the tariffs with the aim of cost recovery, but it is also compelled to protect the customers from undue cost charges and inefficiencies in the services. The board also has the role to guide the WSSS to achieve acceptable service standards but not to uniform the water prices and services to all users.

However, there is no standardized guideline that help the town water supply services and water boards in the study, setting and monitoring of water tariff in the country. The main purpose of this guideline is to breach this gap and to establish a uniform and simplified guidance to be followed for the town water supply services and Town water boards in the study and setting the water tariff for water supply and sewerage services in the country.

2. Water Tariff Setting

2.1 Background

Water tariff is the price paid by consumers for water. Water tariff is calculated in such way that the income from water sales is sufficient to pay for all expenses including some additional savings for further expansion and investment.

There are two main categories of water supply cost to be considered in water tariff setting i.e. the operation & maintenance costs and the capital cost. The operation and maintenance costs are those costs which are used to run the water supply system on daily basis which includes staff salaries, administrative costs, office running costs, chemicals, energy, repair & maintenance costs, payment of vendors etc. In addition to these routine expenses, the Water Supply and Sewerage Services also pay for the expenses like: -

a. The costs of professional support services for regular inspection of electrical and mechanical items, and for advice on financial management (including external auditing of financial records).
b. Regular water quality tests which are carried out by authorized laboratories.
c. A "replacement fund" to pay for replacement of major system components which includes pumping equipment and electrical works, and boreholes, pipes and civil works. Thus, money must be set aside to pay for their replacement.
d. Some money also needs to be set aside by the Water Supply and Sewerage Services as savings in a "capital fund" which is used to pay for new items required for expansion of the water system such as additional storage tanks, distribution pipes and new connections.

Small WSSS requires, in addition, assistance for the following activities:-

- Planning, design and construction management of system expansions, such as increasing water production at the water source (borehole, spring or river intake), extension or rehabilitation of the system pipe network, and construction of new reservoirs.
- Planning to reduce water losses (from pipe leakage) and collection efficiency (to ensure that all water collected at Public Fountains and individual connections is paid for).
- Planning to increase sales through extension of the system pipe network, new connections and tariff management.
- Advice on water quality tests to maintain drinking water quality.
- Advice on reducing operating costs and resolving electrical and mechanical problems.
- Advice and oversight on financial management, such as accounting procedures and external auditing, and investment planning for future expansion of the water system.

Most of the WSSS cannot carry out these activities without professional technical and financial support from regional water bureau or from private service providers. Advices and oversights are also required on financial management which includes

accounting procedures, external auditing, and investment planning/business planning over the next five to ten years for future expansion of the water system.

Thus, Water Supply and Sewerage Services should set a price for water that ensures the *income* from water sales is sufficient to pay for all these costs (*expenses*) of keeping the water system in good condition such that the community receives a reliable supply of safe drinking water taking into account also the government's Water Resources Management policy.

On top of keeping the water system in good condition and providing a reliable supply of safe drinking water to the community, the Water Supply and Sewerage Services must also try to keep the price of water as low as possible. The most effective way for the WSSS to reduce its water price are by:-

- Selling more and more water which reduced the fixed cost per m^3 of water.
- Reducing water losses from pipe leakage and illegal connections,
- Increasing collection efficiency of the water supply service to ensure that all water collected at Public Fountains and individual connections is paid for
- Full and efficient utilization of its resources capacity (assets, manpower etc) and
- Reducing unnecessary operation costs as much as possible.

The total cost of producing one cubic meter of water depends on the total amount of water being produced by the water supply system. If more and more water is produced and sold, then the unit cost of producing water could be reduced, and if the cost of producing water is reduced, then the WSSS can reduce the price paid by the community. It is therefore important for the WSSS to produce and sell as much water as possible, because the utility will then make more money even though the community is paying less for water. Thus, more production and more sales should be the priority of the WSSS. There are many different ways in which the WSSS can increase water sales. The major once are: -

- to increase water demand by encouraging the whole community to use safe water provided by the piped water system instead of using unsafe water from hand dug wells or rivers.
- to encourage individual to connect to the distribution network by reducing connection fees and using soft payments distributed over months etc.
- to plan for extension of the distribution network to new areas and increase number of new public fountains and individual connections.
- to allow individuals to buy water and resell it at a reasonable price either within the community or to neighboring communities.

It is also important for the utility to ensure that all public fountains and individual connections are metered and that meters are properly read and volumetric consumption recorded. Introducing metering and ensuring that billing is based on metering is the only way to guarantee that clients pay according to their consumption and thus to the costs they cause the WSS service. Consumers when metered are better also able to regulate their water consumption according to their ability to pay. Thus,

metering will reduce water consumption to acceptable and affordable levels. If the wastage of water is reduced there is less need to extend treatment plants and other installations which is costly for the water supply service and eventually has to be paid for by the customers through the tariffs. By charging cost covering tariffs combined with the metering of water consumption, the right signals can be given to the consumers so that they can decide how much they can afford or are willing to pay.

The WSSS should also categorize its customer by type of individual connections and get data on number and the volume of water they consume by each category. The followings are the major categories of customer in Ethiopia:-

a) Public fountain
b) Privet house connection
c) Commercial connection
d) Institutional (schools, health clinics, public service offices) connections and
e) Industrial connection.

These information/data helps a lot for tariff settings and for future planning.

2.2 Tariff Objectives

When the Water Supply and Sewerage Service set its water tariff, it has objectives to meet. The followings are the major objectives the tariff seeks to achieve: -

a) Economic efficiency: to ensure water resources are used in the most efficient way at the lowest possible social cost, etc;
b) Full cost-recovery: means that the water supply service is able to recover the cost of operation and maintenance of the WSS systems as well as the cost of investments.
c) Financial stability: tariffs should minimize risks of unexpected revenue fluctuations;
d) Fairness: tariffs should treat all consumers equally.
e) Social orientation of water services: guaranteed provision of **water rights to all consumers** regardless of income etc,
f) Resource conservation: tariffs should encourage resource conservation by the utility itself and consumers;
g) Equity: - equals be treated equally, and un equals be treated unequally.
h) Conservation of treated water:- an incentive to conserve water through payment for actual consumption (metering of consumption) and progressive tariffs to control wastes/misuses because: -

- Safe drinking water is treated with costly chemicals and should therefore only be used for purposes where treated water is necessary due to hygienic reasons and not for watering plants.
- In the process of water distribution, electricity is required for pumping of water and
- A lot of other resources (mainly capital and labour) are used in the WSS services.

i) Environmental protection :- The environment has to be protected for the use of future generations thus, the excessive use of ground water has to be avoided in order to prevent a permanent decline of the groundwater level and sewage has to be treated adequately before being released into the environment.

In addition, to meet the above objectives, there are other factors that need to be considered by the TWSS in tariff designing. The factors are:-

a) **Public acceptability**. A successful tariff design is one that is not controversial, or which does not serve as a focus of public criticism of the water supply agency.
b) **Political acceptability**. A tariff design that is objectionable to political leaders will lead to loss of political support and may cause increased political interference in the operations of the agency.
c) **Simplicity and transparency**. A tariff design should be easy to explain and easy to understand. It should be possible for most users to know what price they are paying for water.

d) **Ease of implementation**. The promulgation and implementation of the revised tariff should not encounter significant barriers in terms of legal authority, administration competence, information requirements, or billing procedures.

Therefore, it is advisable to take care of all these factors to be sure that the tariff proposed will be applicable.

2.3 Tariff Setting Methodology

Each WSSS shall calculate the unit costs (birr/m^3) for each type of cost in order to compare it with the tariff and its impact on the overall cost of the water supply system. The sum of the unit costs of each type of expense indicates the cost recovery tariff level.

Obviously, WSSS expenses and incomes are different for different water supply systems. Therefore, the price paid for water in one town may be different from the price paid for water in another town.

Taking into account all the expenses Water Supply and Sewerage Service should design appropriate tariff by also considering government policies, willingness to pay and affordability of the town population. Regarding water tariff, the "Ethiopian Government Water Resources Management policy' of 1999, says: -

- "*Ensure that Tariff structures are site-specific and determined according to local circumstances,*
- *Insure that rural tariff settings are based on the objective of recovering operation and maintenance costs while urban tariff structures are based on the basis of full cost recovery.*
- *Ensure that tariff structures in water supply systems are based on equitable and practical guidelines and criteria.*
- *Establish a "**Social Tariff**" that enables poor communities to cover operation and maintenance costs.*
- *Establish progressive tariff rates, in urban water supplies, tied to consumption rates.*
- *Develop flat rate tariffs for communal services like hand pumps and public stand posts. "*

These clearly show that, the urban water tariff structure basis full cost recovery, with a social tariff of operation and maintenance cost for poor communities. It also emphasized the need for a combination of progressive tariff tied to consumption rates for house and yard connections and flat tariff for communal services like public tap. Another important aspect of the policy is that tariff should be site and local specific which means that tariffs should take in to account the local conditions of the towns.

Water tariff in WSSS has two different prices for two different levels of services:-

- Water collected at public fountains (Flat tariff rate paid by customers in Birr per liter).
- Water supplied to individual connections (Progressive tariff rate paid in Birr per m^3 which is determined each month from the water meter reading).

The price of water paid at public fountains and individual connections must be set differently so that the income from water sales covers all expenses (including investment and interest). But, the price of water paid at individual connections should be higher than the price of water paid at public fountains because at public fountain tariff is expected to cover only the operation and maintenance costs while other connections should pay, in addition, other costs like depreciation and interest on loans and also subsidize the low income group tariff rate. This differential tariff rate considers affordability to pay, enjoying better level of services and using water for productive uses.

According to the World Bank study “a tariff is affordable as long as the bill does not exceed 5% of the household’s budget". "Willingness to charge" is also as important as "willingness to pay" when considering tariffs. An immediate shift from low-level tariff rate to a very high-level rate (e.g. more than 100% increase) might not be accepted by decision makers and by high tariff pairs too. Therefore, testing willingness to charge is also as important as willingness to pay.

The total annual operation and maintenance cost divided by total annual water sold will give “social tariff/m^3 i.e. water tariff/ m^3 paid at public fountain and this tariff will be the base for other tariffs. The first Block water tariff for residential connections should be the same with the public fountain tariff because as indicated above, each person has the right to receive a minimum level of drinking water supply at an affordable price. Because water is a basic need for every human being and everybody must have access to a certain amount of safe drinking water for cooking and drinking.

The major operation and maintenance costs are personnel cost (which includes staff salaries and related benefits to employees and other expenses), energy cost, chemical cost, Repair & Maintenance cost and new connection cost. the TWSSS should take care of not over or under estimating these costs. It should design as much as possible cost minimization strategy and efficient utilization of its resources during the tariff setting.

Maintenance cost is established as a factor of the investment cost of the various components of the water supply project. It is assumed that maintenance costs at the early stage of the project will be substantially lower than at the later years. /**See Annex 1 on** how to estimate maintenance costs**/.**

For Blocks other than the 1st Block and other individual connections, depreciations and interest on investment will be added on the O& M per cubic meter costs. By depreciation we mean, "*a non - cash expense that reduces the value of an asset as a result of wear and tear, age, or obsolescence*." Most asset lose their value over time (in other words, they depreciate), and must be replaced once the end of their useful life is reached. Depreciation must includes both past values of existing facilities and equipments and costs of new facilities and equipments.

There are several accounting methods that are used in order to write off an asset's depreciation cost over the period of its useful life. Depreciations of different investment components will be calculated using economic life and total costs of different items/activities using straight-line method as shown in ***Annex 2*** attached. This method helps to reduce the amount of annual depreciation to be considered in the tariff.

After calculating annual depreciation using straight line method, divide the sum by average annual projected water sales of the coming five years to get depreciation cost per m^3 of water. We take five year average because the tariff is assumed to be revised every five years and also to reduce the unit annual depreciation costs and hence the tariff. This depreciation cost per cubic meter will be progressively distributed over the individual connection blocks. The methods for distributing the depreciation is given in table 5 below.

As we saw above, the Water Resource Management Policy also says "*Establish progressive tariff rates, in urban water supplies, tied to consumption rates*". The experiences of our water supply & sewerage services also shows as progressive tariff rates tied to consumption are in use but the number of Blocks and intervals between the Blocks vary from town to town.
/See ***Annex 3*** sample blocks and tariffs currently used in sample towns attached./

These different tariffs and blocks in use have got advantages and disadvantages. Some blocks affect the consumer minimum water requirements, while others affect the income of the Water Supply and Sewerage Services. Some higher blocks set are also not in use in most towns because of low consumption of the customers. Thus, it is better for Water Supply and Sewerage Services to select tariff blocks that will not affect both the customers and the WSSS.

Another interesting thing from the prevailing water tariff is that the water tariff paid at public fountains. According to the water resource management policy higher income groups (connection users) should pay higher water tariff and should subsidize the low incomes (PF users). On the contrary, in some water supply services (especially those that out sourced PF) the public fountain users pay extremely high water tariffs than

connection users, hence subsidize the connection users. Some examples are the followings: -

I. **Yirga Chaffe (SNNP).** WSSS collects from water vender (PT water seller) at Birr 2.50 per m^3 while the venders are selling each 20 liters of water at Birr 0.20 which is equivalent to Birr 10 per m^3 to public tap users.

II. **Haik** (Amhara). WSSS collects from water vender (PT water seller) at Birr 3.00 per m^3 while the venders are selling each 20 liters of water at Birr 0.15 which is equivalent to Birr 7.50 per m^3 to public tap users, while connection users pay progressive tariff rate ranging from 3 – 5 Birr/m^3 .)

III. **Meki** (Oromia). WSSS collects from water vender (PT water seller) at Birr 2.25 per m^3 while the venders are selling each 20 liters of water at Birr 0.20 which is equivalent to Birr 10 per m^3 to public tap users.)

IV. **Dupti** (Afar). Public taps are out sourced to service providers and the public fountain users pay very high tariff (>12Birr/ m^3) while utility collects only Birr 0.75/m^3 of water sold. Water tariff at PT is Birr 1.50.

V. In some small towns and rural communities peoples pay up to 0.50 cents per 20 liter container which is 25 Birr per cubic meter.

In addition to the high water tariffs they pay, the public fountain users waste their time and energy for collecting water which they could have been used for other purposes. In the current arrangements neither the utility nor the public tap users have benefitted from the water supply. It is the water venders who collect much money on which they have not invested much. Even most of the utility managers have not realized this. Thus, water supply services need to pay high attention to the water to be paid by PF users during the outsourcing of public taps and should design monitoring methods.

All the above show on one hand low income groups are charged higher tariff than the higher income groups and on the other hand it indicates as the affordability level is higher than what are reported in the water supply study reports which had highly influenced the tariff settings so far. There are also many indicators as the employment opportunities and incomes of the population have been improved in the recent years which display the rise in the affordability levels.

The cost of production and distribution of water has been significantly escalating from time to time. Thus, it is better to seriously investigate the income of the households to set the affordability of the town population before setting water tariffs. The study done by the World Bank has showed as "Tariffs of about $0.40 per m^3 are considered sufficient to cover operating costs in most developing-country contexts, while $1.00 would cover both operation, maintenance and infrastructure costs. The World Bank also calculated, even in the low-income Sub-Saharan countries, up to 40% of the households should be able to pay the full-cost tariff of $1 per $m^{3"}$. / World Bank, WSS in Sub- Sahara Africa site note #8/. Thus, using the current exchange rate (18.3 Birr per 1USD) O&M cost of Birr 7 and full cost recovery tariff of about 18 Birr per m^3 are affordable in low income sub Sahara African Countries where our country is locates.

2.4 Guideline on setting WSSS Water Tariffs

The water tariff structure is composed of mainly two parts: the fixed charge and the usage charge.

A. Fixed Service Charge.

Both domestic and non-domestic water supply categories shall be subject to monthly fixed service charges. It is paid for the services provided by the water supply and sewerage services to customers like water meter reading, meter service etc. The fixed charge varies with meter size and will be charged to customers regardless of the level of consumption. The fixed charge is targeted to cover the administrative overhead costs, usually customer-related costs which are not related to water production and distribution.

The fixed charges are determined and differentiated based on equivalent meter service factors. It is assumed that customers with bigger sized connections enjoy more convenience by getting more water at a faster rate than those with smaller sized connections and hence charged more. In addition, customers are also required to deposit money which also varies with the size of the water meter in WSSSs. The following tables' show current sample Water Supply and Sewerage Services fixed charge and deposit per consumer type.

Table 1 Water Meter Deposit in sample towns

<table>
<tr><td rowspan="3">Ser no.</td><td></td><td>Meter size</td><td colspan="8">WATER METER SERVICE IN BIRR PER METER SIZE</td></tr>
<tr><td></td><td>A.A</td><td colspan="3">Harar</td><td>Hawasa</td><td>Bahir Dar</td><td>Adama</td><td>Meki</td><td>Modjo</td></tr>
<tr><td></td><td>Res.</td><td>Res.</td><td>Com.</td><td>Inst.</td><td>All</td><td>All</td><td>All</td><td>All</td><td>All</td></tr>
<tr><td>1</td><td>½ “</td><td>1.35</td><td>4.00</td><td>6.00</td><td>6.00</td><td>3.00</td><td>2.00</td><td>5.00</td><td>5.00</td><td>5.00</td></tr>
<tr><td>2</td><td>¾ “</td><td>1.50</td><td>4.00</td><td>15.00</td><td>15.00</td><td>4.00</td><td>2.50</td><td>8.00</td><td>8.00</td><td>8.00</td></tr>
<tr><td>3</td><td>1”</td><td>2.25</td><td rowspan="7">4</td><td rowspan="7">15</td><td>22.00</td><td>5.00</td><td>3.00</td><td>10.00</td><td>10.00</td><td>10.00</td></tr>
<tr><td>4</td><td>1 1/4”</td><td>2.85</td><td rowspan="6">22</td><td>6.00</td><td>3.00</td><td>-</td><td>-</td><td></td></tr>
<tr><td>5</td><td>1 ½”</td><td>4.05</td><td>8.00</td><td rowspan="5">3.00</td><td>20.00</td><td>15.00</td><td>15.00</td></tr>
<tr><td>6</td><td>2”</td><td>6.25</td><td>14.00</td><td rowspan="4">30.00</td><td rowspan="4">20.00</td><td rowspan="4">20.00</td></tr>
<tr><td>7</td><td>2 ½”</td><td>7.65</td><td>20.00</td></tr>
<tr><td>8</td><td>3”</td><td>9.05</td><td>24.00</td></tr>
<tr><td>9</td><td>4”</td><td>9.65</td><td>28.00</td></tr>
</table>

The above table shows as in:-

i. **Addis Ababa:-** Different service charge by size of water meter but same for all customers

ii. **<u>Harar</u>** :- Different rent for customers (Residential, Commercial & Institutional) and also by size of water meter

iii. **Hawassa: -** Different service charge by size of water meter but same for all customers,

iv. **Bahir Dar:-** Smaller rent compared to others and the same for all types of customer but very minimal difference b/n meter sizes

v. **Oromia towns:** - same for all customers, but different service charge per meter size.

Table 2 Water Meter Deposit in Sample towns

			WATER METER DEPOSIT IN BIRR PER METER SIZE					
Ser no.	**Meter size**	**AA**	**Hawasa**	**Bahir Dar**		**Adama**	**Meki**	**Modjo**
			All	**Res.**	**Others**	**All**	**All**	**All**
1	**½ "**	120	150.00			75.00	75.00	75.00
2	**¾ "**	133	166.00			100.00	100.00	100.00
3	**1"**	196	245.00			125.00	150.00	
4	**1 1/4"**	251	275.00			-		
5	**1 ½"**	355	301.00	**150.00**	**500.00**	200.00		
6	**2"**	551	689.00			250.00	No customer	No customer
7	**2 ½"**	673	841.00					
8	**3"**	795	994.00					
9	**4"**	835	1174.00					

The table shows as in: -

i. **Addis Ababa**: - Different deposit by size of water meter but same for all customers,

ii. **Hawassa**: - Different deposit by size of water meter but same for all customers,

iii. **Bahir Dar:-** Deposit differs between residential and others but the same for different meter sizes

iv. **Oromia towns: -** Same for all customers, but different deposit per meter size.

Taking into consideration the current reality, experiences of different WSSS and recent studies proposals, the new Water Supply and Sewerage Services fixed charges and deposit per consumer types and water meter size are presented in the following table.

Table 3 Water meters service charge per month and Deposits in Birr.

Meter size	Service charge per month and deposit in Birr			
	Domestic		Non-Domestic	
	Service charge	**Deposit**	**Service charge**	**Deposit**
½"	3.00	**120**	5.00	**200**
¾"	5.00	**150**	7.00	**250**
1" – 2"	7.00	**250**	10.00	**350**
2"- 3"	10.00	**300**	15.00	**400**
>3 "	15.00	**400**	25.00	**500**

The WSSS collect deposits when the customer initially connects to the water system. The purpose of the deposit is not for the security of water meter but for security of the water used. Incase if the customer disappear without paying his/her bill the WSSS will easily confiscate the deposit in the amount of the bill. Only In a case where the bill is more than the deposited amount that the service will take the case to the court. The deposit is estimated based on three months average consumption of the customers.

B. Usage Charge.

The usage charge is the amount to be paid on the volume of water consumed and is based on customer classification and level of consumption. Generally water consumption of households varies with income, connection type and household size. Thus, most towns' domestic (residential) consumers of 1st block and public fountains will have a lower usage tariff. Increasing tariffs apply starting from 2nd consumption block for residential houses and from 1st block for non residential customers.

2.4.1 Setting Tariff Blocks

a. Tariff Blocks for Medium and Large Water Supply & Sewerage Services

As indicated above currently Water Supply and Sewerage Services use many different Blocks. It is better to use few Blocks than many different Blocks. Thus, regarding number of Blocks and their intervals,

I. The number of blocks should not exceed 5 and less than 3 blocks.

II. The initial block should not be less than $3m^3$ (i.e. basic consumption for households with 5 members 20 l/d per month) and not more than $5m^3$. Because, even internationally cited standards for basic water needs are usually in the range of 25 -30 liters per capita per day for a household of five, which comes to 4-5 cubic meters per month per household. (WHO, 1997 ;) This quantity should be accessible at a social price oriented at the purchasing power of the poor. Once this target has been achieved there is no reason why the water in excess of this minimum quantity should not be priced as an economic good at or above full cost recovery. In order to cover the

overall costs, the town water supply service shall be allowed to charge a higher than cost covering tariff for high consumption. Besides financing the subsidised prices for basic consumption, these increasing block tariffs also discourage high consumption, which helps to conserve water.
Accordingly we propose the following Blocks and Block intervals for Water Supply and Sewerage Services of different categories. For simplicity only two groups of blocks (domestic and non domestic) is used in this guideline.

Table 4 Water tariff blocks and ranges for medium and large towns

Block	Range	
	Domestic Users	Non domestic users
1st	0 – 5	0 - 5
2nd	6 – 10	6 - 10
3rd	11 - 15	11 - 25
4th	16 - 20	26 - 40
5th	> 20	> 40

a. Tariff Blocks for Small Water Supply and Sewerage Services

For small towns (with population less than 15,000), we propose to use 4 Block tariff similarly categorized as domestic and non domestic as indicated in the following table.

Table 5 Water tariff blocks and ranges for small towns

Block	Range	
	Domestic users	Non Domestic users
1st	0 - 3	0 - 5
2nd	4 - 7	6 - 10
3rd	8 – 10	11- 25
4th	> 10	>25

Depending on the towns specific situation (weather, social conditions, water sources etc) these towns could also use either of the above categories' for domestic users if they believe and prove it is beneficial for the water service and its customers.

2.4.2 Water Tariff Setting

a) Factors to consider

The first determining factor in tariff setting is the 'Water Resource Management Policy" which says *"water is a social and economic good*". In one hand everybody has the right to get access to clean water with affordable price; while on the other hand, water supply and sewerage services should generate enough funds to cover their costs. Failure to cover cost means that subsidies must be sought from Government or

international organizations. As result sustainability cannot be assured which typically means that capital investment is insufficient the condition of the system deteriorates and service delivery declines. To avoid such a situation, a sound tariff setting should allow the provider to generate sufficient revenues to recover all justified costs in order to ensure sustainability of service provision. Thus, the tariff setting procedure should take into consideration these two contradicting issues, and come up with win-win solution.

The second, determining factor is future development prospects in terms of finance, rate of increase of size of water sale, improvement in the efficiency of the WSSS etc. The third factor is the costs that are to be included must be only those directly relate to the service provided by water supply and sewerage services. Expenses incurred from non- operating activities should not be included in the historical costs that are used as bases for forecasts of expenses.

Finally, water tariff must be calculated on the basis of water consumed not on water produced. This is because only water consumed is paid for, whereas some of the water produced is lost, for example, through pipe leakage and illegal connections. Reducing unaccountable for water is another area that should also get attention for WSSSs to reduce costs and increase its revenue.

Therefore, the water tariff shall be determined considering all these factors in order to sustain financially the WSSS in the future.

b) Data required for water tariff settings

To set water tariff for Water Supply and Sewerage Services historical and forecasted data regarding revenue, expense, water production & consumption, water demand, population & population served etc are very important. At least past three to five years historical data and future five years projection based on the town's business plans/experts best estimate are needed. (See ***Annex 4***) It is also necessary to have data on how the water consumed is distributed by types of consumers and by water blocks. (See Annex 5 and 6)

Thus, before calculating the tariff, it is first necessary to estimate the amount of water that will be consumed next five years at standpipes and individual connections. In addition, system water losses and collection efficiency need to be calculated. It is calculated as follows:-

I. ***Water losses*** *= volume of water produced less volume of water consumed.*

Example: During the previous year, production (P) was 50,000 m^3 and the community consumed (C) 37,50 m^3. What were the water losses (L) last year?

Production = 5000 and Consumption = 37,500

Loss = 50000 – 37,500 = 12500 m^3

As a percentage of production, Loss = 12500 ÷ 50000 = 0.25 = 25%

Answer: - Water losses were 12,500 m^3/year, which is 25% of production

II. **Collection efficiency** = cash collected from water sales divided by revenue billed for water sales.

Example: During the previous year, the amount of cash collected from water sales (at standpipes, and individual connections) was $2,000,000. If the revenue actually billed for water sales was $1,800,000, then what was the collection efficiency last year?

Collection efficiency = 1,800,000 ÷ 2,000,000 = 0.90 = 90%

Answer:- Collection efficiency was 90%

III. The amount of water to be consumed by the community next year at public fountain and individual connections can be estimated from the amount of water consumed last year, together with a number of other factors that need to be taken into consideration. These other factors include, for example:

- Any expansion of the system, including an increase in the number of public fountain and individual connections, which will increase water consumed.
- Price increases which may reduce the amount of water consumed.
- Improved service quality (better water quality, longer hours of service, higher water pressure and flow, and improved customer service) that will increase water consumed.
- Increased water demand resulting from perceptions of improved health through use of safe water.
- Increased use of meters which leads to more accurate billing of customers, and more careful use of water.

Lastly, the water supply service needs to compare expected water demand with system production capacity, to ensure that supply can meet demand.

Table 6. Average past 3 years and next 5 years water consumption

(By type of customers)

Ser. no	***Description***	***Average of past 3 years***	***Projected next 5 years average***	***Average of the 8 years***	***Per cent of the total***
1	***Public fountains***				
2	***Residential Connections***				
3	***Institutional connections***				
4	***Commercial and Industrial connections***				
	Total				

Table 7: Average percentage consumption for past 3 years and next 5 years

(By customer and blocks)

Block	Domestic		Blocks	Institutional		Commercial and Industry	
	Volume (M^3)	%		Volume (M^3)	%	Volume (M^3)	%
0 – 5 m^3			**0 - 5**				
6 - 10 m^3			**6 - 10**				
11 - 15 m^3			**11- 25**				
16 - 20 m^3			**26 - 40**				
> 20 m^3			**> 40**				
Total							

The other data required are list of water supply components and utility fixed assets and their economic life and total costs to calculate annual replacements/maintenances and depreciation. /See ***Annex 2 &3*** for Maintenance and depreciation cost calculations/.

Table 8: Operations and Maintenance Cost Summary

	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Average
O&M costs (Birr ,000)							
Operation:							
Chemical							
Energy							
Personnel							
Water meters							
Total operation							
Maintenance:							
Civil works							
Pipe lines							
Electro mechanical							
Total maintenance							
Total O & M							

Table 9 Estimation of Annual Depreciation Costs

Birr (000)

Ser. No	Investment costs	Total Birr (1000)	Econ Life	Year					Total	Average
			Yrs	1	2	3	4	5		
1	General Items		0							
	Source development:									
2	Civil works		25							
3	Mech./Elec. works		10							
	Treatment:									
4	Civil works		50							
5	Mech./Elec. works		15							
6	Collectors, transmission main		40							
	Pumping station:									
7	Civil works		50							
8	Mech./Elec. works		15							
9	Storage		50							
	Distribution system		25							
10	Public fountains		10							
	Office and auxiliary buildings:									
11	Civil works		50							
12	Mech./Elec. works		15							
13	Power supply		15							
14	Access road		0							
	Annual depreciation									

Source: - Issue paper

c) Water Tariff calculations

There are three options used for calculating water tariff in this guideline.

I. Full cost recovery water price through progressive tariff

The total computed annual depreciation divided by average annual total water to be sold equals depreciation per m^3 of water to be sold. This cost will be distributed amongst the connection users based on willingness to pay and affordability of the customers. Table 10 below shows the intervals to be used for the service types.

Table 10: Tariff rate calculation for different customers

Unit depreciation cost distribution by type of customer and Block				
Residential		***Non- residential***		
Tariff block	**Tariff incremental**	**Tariff block**	***Institutional***	***Commercial & Industrial***
			***Tariff* incremental**	***Tariff* incremental**
0 - 5	0.00	**0 - 5**	0.50	0.75
6 - 10	0.25	**6 - 10**	1.00	1.00
11 - 16	0.75	**11 - 25**	1.25	1.50
16 - 20	1.00	**26 - 40**	1.50	2.00
>20	1.25	**> 40**	2.00	2.50

Residential connections are believed to be the largest WSSS water consumers in most of the towns. Thus, in addition to O&M costs the tariff must also cover part of the depreciation distributed progressively over the blocks. For non residential connections average of projected five years O & M cost per cubic meter plus the annual depreciation costs per cubic meter will be distributed progressively over the Blocks. The Non residential users will also start cross subsidizing the low income residential and public fountain users starting from block 3 based on the depreciation unit value as shown in the table 10 above. For loan towns the depreciation should include interest on the investments too.

Both depreciation costs and O & M costs shall be distributed amongst different customers using the incremental rates per Block and type of customer. Table 11 below shows how water tariffs should be set for residential, commercial, institutional and industrial water users in 5 Block progressive tariff systems and the above tariff incremental. The table shows residential users are under subsidy up to the 4^{th} block and start cross subsidy in block 5. The non residential users start cross subsidy from block 3 onwards.

The percentage water consumption distribution need to be fixed based on the past three to five years average consumption bills for all connection users and next five years projection based on business plan. /***See Annex 4***/. It is also important to have average monthly consumption per block of all customers.

For residential houses, as shown above, average of projected five years operation and maintenance unit cost plus part of the annual depreciation unit costs should be distributed over the Blocks progressively using the tariff incremental.

Residential customers reach full cost recovery tariff at block 4 and start cross subsidizing public fountain users in block 5, while non residential customers reach full cost recovery at 2nd block and start cross subsidy then after.

If unit O&M is Birr 3/m^3 and unit depreciation cost equals Birr 2/m^3 (total = Birr 5/$m^{3)}$ then the tariff will be distributed by type of customer and blocks as shown in table 11 below.

Table 11: Tariff rate calculation for different customers

O&M Birr/m3		**Depreciation Birr/m3**		
3.00		**2.00**		
Tariff block	**Unit Depreciation cost distribution by type of customer and Block**			
		Non- residential		
	Residential	**Tariff block**	***Institutional***	***Commercial & Industrial***
	Tariff		***Tariff***	***Tariff***
0 - 5	3.00	0 - 5	4.00	4.50
6 to 10	3.50	6 -10	5.00	5.00
11 to 16	4.50	11 - 25	5.50	6.00
16 - 20	5.00	26 - 40	6.00	7.00
>20	5.50	> 40	7.00	8.00
PT	**3.00**			

Formula is (O&M unit cost) + (Depreciation unit cost X Block weight) = Block Tariff

NB.

- Total operation & maintenance and depreciation costs may not be fully recovered in the first two years but gradually the WSSSs will collect more revenue which will cover the losses incurred earlier years. If the loss is high by the above method the remaining cost will be evenly distributed on all the connections and blocks up to all costs will be recovered.
- If investment costs are on grant only 50% of the investment costs should be considered in the tariff as depreciation and the remaining serves as a subsidy for all users. When the investment is on loan full investment and interests should be fully considered. Community contributions and regional government subsidies on investment should be deducted from investment cost to reduce depreciation costs.

- If there is other subsidy (like materials, equipment etc) that amount must be reduced from the operation and maintenance costs which will reduce unit O & M tariff/M^3 for all users.

II. Mixed progressive and flat water tariff rates

The other option is to charge residential connections progressive tariff, as indicated above, and the non residential users at flat tariff rate. Blocks need not necessarily be introduced since nonresidential do not have a need for a basic consumption, like individuals, unless there is a need to give an incentive for water conservation. In such a case there is special consideration necessary concerning the quantity of the blocks. The water tariffs applied to commerce, industry and institution should be at full cost recovery. Here too it is necessary to check whether the flat rate tariff will also cross subsidize the low income groups.

This approach will have advantage of simplicity for management but have disadvantage of discouraging non residential users', especially commercial customers in small towns, from using commercial connection. It might also lead to political interferences based on the government water management police.

Except for loan paying Water Supply and Sewerage Services, for the rest, all those depreciation costs/ revenue collected through the tariff should go to the blocked account saving of the WSSS every year and used only for investments up on approval of the town water board.

III. Small Water Supply and Sewerage Services

For small towns, with population less than 15,000, it is better to use fewer blocks with smaller intervals, as given below (Table 12) and different tariff rates but relatively smaller type of incremental progressive water tariff rate for residential and non residential customers. The tariff base will be the same with the above i.e. average of 3 - 5 years projected operation and maintenance unit cost plus annual depreciation cost divided by average five years projected water consumption. Unit depreciation cost will be distributed progressively as follows.

Table 12 Water Tariff blocks and tariff distribution for small towns

Block	***Depreciation per m3 will distributed as follows***			
	Domestic users		***Non - Domestic users***	
	Block Range	**Tariff/m^3**	**Block Range**	**Tariff/m^3**
1st	0 - 3	0.00	0 - 5	0.25
2nd	4 - 7	0.25	6 - 10	0.75
3rd	8 – 10	0.75	11- 25	1.25
4th	> 10	1.25	>25	1.75

NB. When WS project cost is covered by grant at least 50% of the investment cost should be considered in the tariff as a saving for future investment and expansion works. In case of loans

part of the loan should be covered by local governments and other funding agencies through grants and subsidies because in these towns peoples are believed low income and commercial and industrial consumers are very few.

The water tariff for small towns using the above O & M cost and depreciation cost per m^3 is shown in table 13 below.

Table 13 Sample tariff for small Water Supply and Sewerage Services computed using the above O&M and Depreciation costs i.e. Birr **2**/M^3 O&M and Birr **1.50**/m^3 depreciation)

Block	**Block Range**	**Tariff/m^3**	**Block Range**	**Tariff/m^3**
1st	**0 - 3**	2.00	**0 - 5**	2.38
2nd	**4 - 7**	2.38	**6 - 10**	3.13
3rd	**8 – 10**	3.13	**11 - 25**	3.88
4th	**> 10**	3.88	**>25**	4.63
PT		**2.00**		

The best practice of public fountain management is that vendors pay the water supply service a flat rate for the volume of water recorded at their public fountain meter, and sell water to consumers at a higher price that is also fixed by the water board. Under this arrangement there are incentives to reduce water losses, because the vendor "pays" for water losses that occur at the public fountain. The arrangement is also easy to implement, because the water supply service can establish bulk sales from meter readings, and the vendors are responsible for collecting their own revenue through "pay as you fetch".

The town water supply service has the obligation to control the tariffs at the public fountains to ensure that the poor can afford to pay the price and that they benefit from the social lifeline tariff. Thus, the public fountain users' should pay the tariff set by the water resource policy i.et flat rate of O & M tariff whether the utility distributes or out sources to venders. Water tariff per 25 liters of bucket should not exceed Birr 0.15 (including water losses & vender costs) which amount to Birr 6/$m^{3.}$ Because O & M also includes labour costs which the utility will not pay for. Even if more it should be covered by cross subsidy. 25 liters will also include water losses during distribution because most water collector in public tap uses 15 – 25 liter containers.

ANNEXES

ANNEX NO. 1
Maintenance & Replacement Costs of infrastructure in WSSS

Ser. No.	***Item***	**Size**	**Qty.**	**Year of construction**	**Total cost [Birr]**	**Maintenance Charge (%)**	**Annual maintenance cost**
1	Water Points					2%	
2	Private Connections					2%	
3	GS (GI) pipes	1- 4"				2%	
4	PVC pipes					2%	
5	Boreholes, Reservoir & Raising mains					2%	
6	Pumps & Engine					10%	
7	EELPA					1%	
8	Generator Sets	20 & 30 KVA				10%	
9	Switchboard					5%	
10	Pump house					3%	
11	Master Meter 2"					2%	
12	Cupboard					10%	
13	Table & Chairs					10%	
14	Pipe wrench					5%	
15	Computer, Information system & other software products					25%	
			Total annual maintenance cost (Birr/year				

Annex - 2
Economic life of various investments and Depreciations

Ser. No	Description	Total investment Birr	Economic life/ year of service/	Annual Depreciation amount in Birr	Depreciation in percentage
1	General items		1		**100**
2	Source development		50		**2**
3	Treatment		50		**2**
4	Transmission line		40		**2.50**
5	Pumping station		50		**2**
6	Construction of collector chamber and wet wells		50		**2**
7	Distribution system		25		**4**
8	Construction of guard and generator office		20		**5**
9	Public fountains		15		**6.67**
10	Office and auxiliary building		50		**2**
11	Electro mechanical		15		**6.67**
12	Access road		1		**100**
13	Design and supervision		1		**100**
14	Capacity building		1		**100**
15	Contingency		1		**100**
16	Vat		1		**100**
17	Immediate environment		1		**100**
18	Spring & wells		50		**2**
19	Building		30		**33**
20	Reservoir		60		**1.7**
21	Pipe line		35		**2.9**
22	Pumps		10		**10**
23	Meter & gauges		8		**12.5**
24	Motor vehicles		10		**10**
25	Furniture		10		**10**
26	Office equipment		10		**10**
27	Computer		8		**12.5**
28	Machinery		8		**12.5**
29	Workshop equipment		8		**12.5**
30	Lab equipment		10		**10**
31	Communication equipment		10		**10**
	Total	**TC**		**TD**	

Annex 3 Sample towns tariff blocks and tariffs rates by regions

1. Oromia towns

Ambo		Dodola		Bale Robe		Shashamane		Bule Hora	
Block	**Tariff**	**Block**	**Tariff**	**Block**	**Tariff**	**Block**	**Tariff**	**Block**	**Tariff**
0 - 3	3.00	0 - 3	2.00	**0 - 5**	2.50	**0 - 2**	4.60	0 - 3	3.50
4 - 7	3.45	4 - 5 to	2.35	6 - 10	3.00	3 - 4	5.30	4 - 6	4.20
8 - 10	3.95	6 - 8	2.75	11 - 30	3.50	5 - 7	5.80	7 - 10	5.00
> 10	4.50	9 - 11	3.25	> 30	4.00	8 - 11	6.48	11 - 15	6.00
		>11	3.85			> 11	7.00	16 - 20	7.20
								> 20	8.60

2. Tegrayi towns

Meklle		Wuqro	
Block	***Tariff***	**Block**	***Tariff***
0 - 5	2.30	0 - 5	3.00
6 - 10	3.50	6 - 10	5.00
11 - 20	4.90	11 - 30	10.00
> 20	6.10	31 - 50	20.00
		PT	**5.00**

3. Gambella town

Gambella	
0 to 5	**4.00**
6 to 10	**6.00**
> 11	**9.00**

4. Amhara towns

Debre Markos		Bahir Dar		Gonder		Dessie	
Block	**Tariff**	**Block**	**Tariff**	**Block**	**Tariff**	**Block**	**Tariff**
0 - 5	3.25	0 - 5	2.9	**1 - 3**	4.00	1 - 3	3.00
6 - 15	4.00	6 - 10	4.4	**4 - 6**	4.25	4 - 6	3.50
16 - 25	4.50	11 - 25	6.1	**7 - 10**	4.50	7 - 10	4.50
>25	5.25	>25	8.2	**11 - 15**	4.75	11 - 25	6.50
Commercial	**5.25**	**PT**	**1.35**	**16 - 25**	5.00	> 25	8.00
Institutions	**4.00**			**26 - 40**	5.25	**Institutions**	**6.75**
				41 - 100	5.50	**Commercial.**	**8.25**
				> 100	5.75	**PT**	**3.75**

5. Afar

Mile		Assayita		Awash Arba	
Block	Tariff	**Block**	Tariff	**Block**	Tariff
0 - 5	1.50	0 - 5	1.50	0 - 5	2.50
6 - 10	2.50	6 - 10	2.50	6 - 10	3.00
11 - 30	3.40	11 - 30	3.40	11 - 30	3.50
> 30	4.20	> 30	4.20	> 30	4.50
PF	**1.50**	**PF**	**1.50**		

Annex 4

Water Consumption and Future Demand Projection

S. N	Description	Historical years			Average of three years	Forecast years					5 years average	% of the total
		2009	2010	2011		2012	2013	2014	2015	2016		
1	Public Fountains											
2	Residential connections											
3	Commercial Connections											
4	Institutional Consumptions											
5	Industrial Consumptions											
	Total											

ANNEX 5

Average percentage consumption for past 3 years and next 5 years

(By customer and blocks)

Block/month	Domestic	Commercial	Institutional	Industry	Total
0 – 5 m^3					
6 - 10 m^3					
11 - 15 m^3					
16 - 20 m^3					
21-25 m^3					
Above 25 m^3					
Total					

ANNEX 6

Average past 3 years and next 5 years water consumption

(By type of customers)

Ser. no	*description*	*Average of past 3 years*	*Projected next 5 years average*	*Average of the 8 years*	*Per cent of the total*
1	***Public fountains***				
2	***Residential Connections***				
3	***Commercial connections***				
4	***Institutional connections***				
5	***Industrial connections***				
6	***Others***				
	Total				