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# Zimbabwe Urban Water Tariff Study

## Final Report

**December 2011**

**Submitted to the World Bank and the Government of Zimbabwe by:**

**Economic Consulting Associates**

Economic Consulting Associates Limited
41 Lonsdale Road, London NW6 6RA, UK
tel: +44 20 7604 4545, fax: +44 20 7604 4547
http://www.eca-uk.com

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# Abbreviations and Acronyms

| | |
|---|---|
| ADB | African Development Bank |
| AMCOW | African Ministerial Conference on Water |
| ATA | Automatic tariff adjustment |
| BNR | Biological nutrient removal |
| DWAF | Department of Water Affairs and Forestry (South Africa) |
| DWD | Directorate of Water Development (Uganda) |
| ESC | Essential Services Commission |
| ETR | Extraordinary tariff review |
| EWRA | Egyptian Water and Wastewater Regulatory Authority |
| EWURA | Egyptian Water and Wastewater Regulatory Agency |
| GTZ | Deutsche Gesellschaft fur Technische Zusammenarbeit |
| HDA | High density area |
| IBNET | International Benchmarking Network for Water and Sanitation Utilities |
| IBT | Increasing Block Tariff |
| IDAMCs | Internally Delegated Area Management Contracts |
| KPI | Key Performance Indicator |
| LDA | Low density area |
| LRMC | Long run marginal cost |
| MDTF | Multi-Donor Trust Fund |
| MTP | Medium Term Plan |
| MWLE | Ministry of Water, Land and Environment (Uganda) |
| MWRDM | Ministry of Water Resource Development and Management |
| NAC | National Action Committee |
| NRW | Non-Revenue Water (including UfW) |

| | |
|---|---|
| NWASCO | National Water Supply & Sanitation Council (Zambia) |
| NWSC | National Water and Sewerage Corporation (Uganda) |
| O&M | Operation and Maintenance |
| OFWAT | Water Services Regulatory Authority of England and Wales |
| PCRC | Performance Contract Review Committee |
| PTR | Periodic tariff review |
| PURC | Public Utilities Regulatory Commission (Ghana) |
| RWSS | Rural Water Supply and Sanitation |
| STW | Sewage Treatment Works |
| TOR | Terms of Reference |
| UCA | Urban Councils Act |
| UCAZ | Urban Councils Association of Zimbabwe |
| UfW | Unaccounted for Water (component of NRW) |
| ULC | Urban Local Council |
| W&S | Water supply and sanitation or water and sewerage (depending on the context) |
| WASREB | Water Services Regulatory Board ( Kenya) |
| WDM | Water demand management |
| WSA | Water Services Authority at municipal level (South Africa) |
| WTW | Water Treatment Works |
| ZDC | Zone Development Committee (Zambia) |
| ZESA | Zimbabwe Electricity Supply Authority |
| ZimVAC | Zimbabwe Vulnerability Assessment Committee |
| ZINWA | Zimbabwe National Water Authority |

# Executive Summary

## Project objectives and execution

The objectives of the study are to provide:

- ❑ the methodology for establishing cost recovery tariff levels and an appropriate tariff and subsidy structure to simultaneously meet a number of national objectives;
- ❑ financial tariff models for each of the 7 Municipalities (Harare, Bulawayo, Chitungwiza, Mutare, Kwekwe, Masvingo and Chegutu);
- ❑ discussion of options for an institutional regulatory framework to manage the tariff review process, monitor and benchmark performance and provide incentives for continuous performance improvement;
- ❑ training in the use of the models, the tariff methodology, benchmarking and incentive regulation.

The study commenced on 1 August 2011 and involved extensive consultation with the 7 Municipalities involved as well as key entities in Harare, notably the Ministry of Water and the Ministry of Local Government. The main Stakeholder Workshop was held on 5 December, followed by a Training Workshop and final hand-over of the tariff models on 6 December.

The approach of the study was consultative and integrative. The 7 Municipalities engaged in the study at the level of the Town Clerk, Town Treasurer and Town Engineer.

### Tariff framework

The Municipalities seek to enhance their autonomy and accountability to their residents. With the notable exception of Harare, water and sewerage in their view should continue to be an integral part of the municipalities and should continue to cross-subsidise other municipal services.

Broad policy issues are at stake, which cannot be resolved within the scope of this study. Fundamental decisions are needed on the position, roles, responsibilities and financing (recurrent and capital) of Urban Local Councils. Charging mechanisms should support the one city concept.

## Water and sewerage tariffs in the 7 Municipalities – technical aspects

Only 2 of the 7 Municipalities are more-or-less meeting the demand for water (Mutare and Kwekwe). The main problems faced by water and sewerage (W&S) departments are high population growth, high losses (technical and commercial), high fraction of non-functioning meters and low recovery ratios on billed water.

People without adequate municipal supplies of water are surviving through boreholes (using handpumps in the HDAs), shallow wells, surface water and water purchases. Our models have tried to provide a comprehensive picture of supply and demand by including estimates of self supply.

The state of the infrastructure varies, but one of the common problems is lack of functioning meters. People getting water are using more than the assumed volume they are charged for. People not getting water are unwilling to pay monthly fixed charges.

On the sewerage side, nearly all of the biological nutrient reduction (BNR) plants are not working. The ponds are still working, but overall there is a high degree of pollution of streams due to spillage from sewers, sewage pump stations and discharge of raw sewage at treatment works, as well as failure of effluent pumps.

Pollution has most impact in Harare and Chitungwiza, where the sewage discharge is upstream of water intakes.

## Water and sewerage tariffs in the 7 Municipalities – financial aspects

The financial position of the W&S departments is generally precarious due to the following factors:

- ***Collection efficiency is low: 30 – 60%*** (customers are unwilling to pay when service is poor)
- ***Non-revenue water (NRW) is high: 40 – 60%*** (lack of working meters, as already noted, is a big problem contributing to NRW)
- ***Spending on essential fixed costs is low*** (salaries, repairs and maintenance and capital)
- ***Transfers of funds*** from water account is significant (Harare is the exception).

The tariff methodology recommended and applied in the study is forward-looking. The Municipalities expect to make significant improvements in service delivery and revenue generation in the next couple of years. Cumulative benefits are expected as non-revenue water declines, access to water improves and willingness to pay increases. The resulting downward pressure on tariffs is offset by the need to increase infrastructure spending (maintenance, rehabilitation and investment).

Zimbabwe's urban areas have some of the lowest cost treated water in the region (the lowest being $0.05/m3 in Mutare). Tariffs are also very low by regional standards.

## Regulatory framework

The benefits of a well functioning regulator would be professional and independent guidance of the development of the water and sewerage sector, but there are also

risks. Further discussion and debate is needed before deciding on the regulatory structure which is most appropriate for Zimbabwe.

## Recommendations

***Context for the recommendations:*** The recommendations of this study are formulated in the context of on-going debates about the position, role and financing of Urban Local Councils and appropriate regulatory structures for urban W&S service delivery. Following the vigorous debate about these issues at the workshop, the final section of the report provides tables of options for ringfencing and for regulation.

The recommendations are couched in the spirit of furthering national decentralisation goals through W&S tariffs being specific to the municipality, reflecting differential costs and decisions about tariff structure are to be decided at the local level.

Municipalities are committed to obtaining endorsement of tariff proposals from their residents. The consultation procedures before tariff changes are made are often quite exhaustive. We strongly recommend that such consultation be reinforced and continued.

***Tariff structure***: Simple tariff structures are recommended for ease of implementation and for customer understanding. The municipalities have already adopted this principle. Different Municipalities are experimenting with different structures: these should be monitored and the lessons learnt disseminated.

***Tariff levels***: In 2 of the municipalities, the models indicate that combined water and sewerage tariffs can be lowered slightly, in other cases increases of between 13% and 75% are required. These results are derived in a situation where the W&S systems are still in a precarious state, and many of the assumed numbers could change significantly. The calculated increases are very sensitive to certain key assumptions, notably the collection ration.

| Calculated tariffs | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Av water tariff as billed | $/m3 | 0.82 | 0.60 | 0.76 | 0.23 | 0.46 | 0.58 | 0.26 |
| Policy scenario - O&M - water | $/m3 | 0.75 | 0.48 | 1.36 | 0.24 | 0.42 | 0.57 | 0.31 |
| Increase in water tariff | % | -8% | -21% | 78% | 7% | -8% | 0% | 19% |
| Av sewerage tariff as billed | $/m3 | 0.23 | 0.17 | 0.27 | 0.11 | 0.08 | 0.15 | 0.07 |
| Policy scenario - O&M - sewerage | $/m3 | 0.58 | 0.32 | 0.43 | 0.18 | 0.12 | 0.27 | 0.12 |
| Increase in sewerage tariff | % | 152% | 80% | 61% | 57% | 43% | 89% | 58% |
| Av combined tariff as billed | $/m3 | 0.98 | 0.73 | 0.95 | 0.31 | 0.51 | 0.68 | 0.31 |
| Policy scenario - O&M - 70% return | $/m3 | 1.15 | 0.70 | 1.66 | 0.37 | 0.50 | 0.77 | 0.39 |
| Increase in combined tariff | % | 18% | -4% | 75% | 20% | -2% | 13% | 26% |

Taking account also of affordability issues, we do NOT recommend that water tariffs be changed rapidly. However, sewerage tariffs which are generally far too low, should be the first target of increases. The obvious time to increase sewerage tariffs is when the rehabilitation of sewage treatment works is completed.

***Asset valuations:*** we recommend that asset revaluation exercises be undertaken and accurate Asset Registers be maintained on a replacement cost basis. In future, this will form the basis for reliable assessments to be made of the levels of maintenance expenditure that are necessary and which should be allowed in revenue requirement calculations, and hence in tariffs.

***Accounting ring fencing:*** We recommend that all municipalities improve their cost accounting so that the reported costs of W&S delivery are reliable. Transfers from the W&S account to finance other functions of the municipality should be clearly and fully reflected in the accounts.

***Immediate establishment of monitoring and benchmarking system:*** While decisions are made on the institutional form of regulation and the enabling legislation is put in place, an immediate useful step would be for the Urban Councils Association of Zimbabwe (UCAZ) to set up a Water Office, which would establish a monitoring system and publish regular bulletins which:

- ❑ benchmark the comparative performance of urban water and sewerage (W&S) providers;
- ❑ disseminate useful experience, for example the lessons learnt from pilot projects on pre-payment meters.

***Quick wins:*** Municipalities should look out for opportunities to rapidly increase their revenue flow while expending relatively modest amounts to bring about the improvement. Replacement of broken or missing meters, whether by conventional or prepayment meters, is a case in point. Putting customers on to a volumetric tariff instead of a fixed (estimated) level is expected to reduce technical losses allowing other customers to be supplied and to start contributing to revenues.

If no other financing is available for such 'quick win' strategies, it would be worth temporarily reducing transfers from W&S to other services in the municipality in order to significantly increase overall revenues. Building on the quick win experience and the African Development Bank and other investment projects which are about to take place, medium and long-term prioritised investment plans are to be drawn up.

### Ringfencing and regulatory options

***Ringfencing -*** the main options to be considered are:

- ❑ Status quo
- ❑ Ringfenced accounting
- ❑ Full ringfencing (ringfenced accounting with all W&S revenues earmarked for W&S purposes only)
- ❑ Unbundling (W&S departments removed and registered under the Companies Act)

***Regulatory options -*** the main options to be considered are:

- ❑ Status quo
- ❑ Regulatory framework within central and local government (no stand-alone regulatory institution)
- ❑ Regulatory institutions – either sector-specific or multi-sector
- ❑ Regulation by contract

Comparative tables are provided in Section 6.2 which give the main pros and cons of the above options.

# 1 Study background, objectives and execution

## 1.1 Background

Water in Zimbabwe is vested in the President and managed by the Ministry of Water Resources Development and Management. Much of the infrastructure of the country is operated by the Zimbabwe National Water Authority (ZINWA), which supplies both bulk water for treatment by local authorities as well as treated water within certain municipalities (outside of the 7 envisaged for this study).

Water providers in Zimbabwe, whether urban or rural, are experiencing difficulty in maintaining sustainable operations. Water tariffs in many municipalities remained unchanged for several decades and as a consequence, so there are insufficient financial resources to operate and maintain existing systems in a financially sound manner, let alone expand. After an extended period of grossly inadequate maintenance, major rehabilitation and replacement investment is now urgently required in almost all municipalities.

Against a backdrop of under-pricing of water in the 1990s, which had already led to performance declines, the period of hyperinflation was particularly destructive as real revenues for the water sector dwindled to derisory levels, with service standards and the quality of infrastructure plummeting. To counter the outbreak of cholera, UNICEF had to step in and provide water treatment chemicals. The supply is to be phased out over a 9 month period (July 2011-March 2012), following a study that is currently underway[1].

Largely due to fiscal pressure and demands for improvement in reliability of service, pressure is mounting on water providers to improve on cost recovery and reduce explicit or implicit reliance on the government budget. There is general agreement that the primary requirement is a sound water tariff and cost recovery policy that suit current conditions in the country and proper management to control cost.

Problems which have important implications for the tariff study and which are common to all of the municipalities include the following:

- ***Frequent power interruptions***: in many centres in Zimbabwe, load shedding is the single biggest water supply constraint. ZESA is endeavouring to ensure continuous supply of electricity for water pumping and purification. The costs of electricity in the tariff model need to reflect proper supplies of power and not the historical undersupply and hence relatively low electricity payments.

- ***Maintenance requirements***: A similar situation applies to maintenance costs, where a projection of current figures would give a misleadingly

[1] This is being conducted for UNICEF by Pricewaterhousecoopers (PWC). We are in touch with the PWC team and seek to ensure that the 2 studies are conducted in a complementary fashion.

low amount for maintenance. Provision in the tariff model needs to be made for a level of maintenance adequate to ensure sustainable operation of the system, taking account of any investments that are already scheduled which will put in place newer equipment.

- ***Staff costs***: The number of staff employed, their skill levels and remuneration is to be assessed relative to the size and scope of each water supply authority's operations. Again, various distortions may exist currently and these would need to be taken into account when projecting financing requirements into the future.

- ***Non-working meters***: due to a variety of causes, a large proportion of customers no longer have working water meters. This provides a significant barrier to designing a tariff structure which meets equity and environmental objectives in addition to cost recovery.

- ***Poverty***: inability to pay for water when tariffs are raised is a serious concern. In an earlier epoch, there were significant cross-subsidies between water consumers in low density and high density areas. Since then, many low density homes have resorted to self-supply, thereby removing the potential for cross-subsidies in the future when tariffs are raised to cost recovery levels.

- ***Billing and collection***: billing and collection efficiencies have declined markedly in many water authorities in Zimbabwe in recent years. In part, this has become a vicious cycle whereby non-working meters and inaccurate/deficient billing result in more and more customers refusing to pay water bills. Provision of intermittent or no water also contributes to refusal to pay water bills.

- ***Lack of ring-fencing of water revenues***: as already noted, in almost all municipalities, water revenues are used to cover a variety of cost items. This is a historical legacy: the first municipal council formed in Zimbabwe was the Salisbury Sanitary Board. The rest of the municipal structures were put in place to support water and sanitation activities hence a feeling that W&S "own" councils and are therefore inseparable. From a narrow water sector perspective, however, it would be desirable for the water revenues to be earmarked for deployment for water purposes. However, cognisance needs to be taken of the practice of inter-sector cross-subsidies, which traditionally was the basis for urban development financing. The water account is regarded as the goose that lays the golden eggs. Sub-national credit worthiness may still require water revenues to be taken into account, but without depriving the water sector of the funds necessary for sustainable delivery of services.

## 1.2 Study objectives

The Zimbabwe Urban Water Tariff Study is funded by the Multi Donor Trust Fund and executed by the World Bank, under the Task Team Leader, Mathewos Woldu. The objectives of the study are to provide:

- The ***methodology*** for establishing cost recovery ***tariff levels*** and an appropriate ***tariff and subsidy structure*** to simultaneously meet a number of national objectives.
- ***Financial tariff models for each of the 7 Municipalities*** (Harare, Bulawayo, Chitungwiza, Mutare, Kwekwe, Masvingo and Chegutu).
- Discussion of options for an ***institutional regulatory framework*** to manage the ***tariff review process***, monitor and ***benchmark*** performance and provide ***incentives for continuous performance improvement.***
- ***Training*** in the use of the models, the tariff methodology, benchmarking and incentive regulation.

The objectives laid out in the TOR for the tariffs are discussed in Section 3.1.

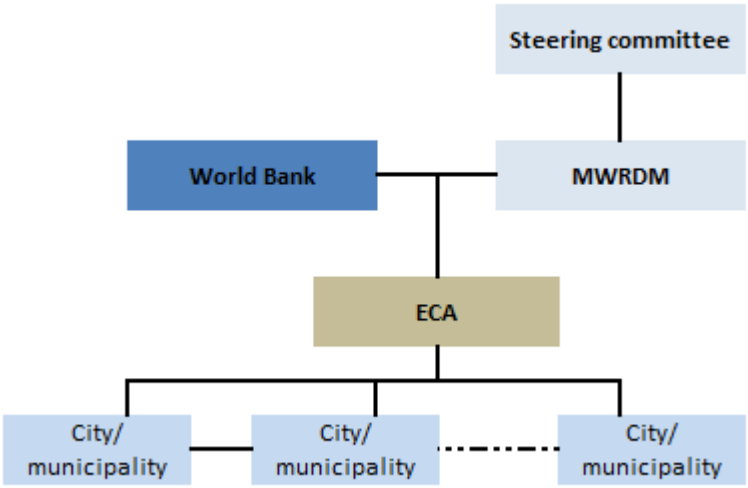
## 1.3 Study execution

Economic Consulting Associates was contracted by the World Bank to undertake the Zimbabwe Urban Water Tariff Study, with a commencement date of 1 August 2011. Work began immediately on preparing a questionnaire for the Municipalities, as well as research on a number of the topics covered in the terms of reference. The questionnaire was piloted with 4 of the Municipalities (Chegutu, Mutare, Harare, and Chitungwiza) during the week of 14 August. The Urban Councils Association of Zimbabwe assisted in setting up the appointments and briefing the Municipalities about the study.

During the same week, meetings were also held with the Ministry of Water, including the Minister and the World Bank, the African Development Bank. A Steering Committee, which is chaired by the Ministry of Water, was formed with members being the Urban Sub-Committee of the National Action Committee. The organisational structure for the execution of the study is shown in Figure 2 below.

A Tariff Study Launch Meeting, involving the full study team, was held on 30 August in the World Bank offices in Harare. The objective was to present the Inception Report to the Steering Committee and other stakeholders. In the remainder of that week, the team visited Masvingo, Kwekwe and Chegutu Municipalities and had a meeting with the Director of Urban Local Authorities in the Ministry of Local Government.

**Figure 1: Organisation structure of the project**




Information about Bulawayo was collected during the GIZ-hosted visits to Bulawayo Water during the 10 day period starting 5 September. During the first week of September, the Team Leader had discussions in Nairobi with Dominick de Waal, concerning coordinating policy aspects of the tariff study with the WSP-Africa / World Bank assistance to Zimbabwe to formulate a comprehensive new water policy. Subsequent discussions were held with other team members during the Policy Study mission (12-16 September).

The tariff study team was represented by the team's institutional specialist (Dr Ramson Mbetu) at the Joint Water Sector Review meetings held on 3 November. He has also met with the Ministries of Water and Local Government on policy and legislative framework issues.

At the end of October and the first week of November, two working papers were produced and circulated to the Municipalities, the Steering Committee (via the Ministry of Water) and the World Bank:

- **Working Paper 1:** ***Methodology and Institutional Framework for Tariff Setting***
- **Working Paper 2:** ***Water and Sewerage Tariffs for 7 Municipalities***

Field visits to each Municipality were then conducted over the period 14-21 November to verify the data and assumptions in the models and discuss strategies to achieve financial viability. Those conducting the verification visits were the Team Leader (Dr Peter Robinson) and the team's Water Engineer (Eng Peter Morris) and Financial Modeller (Robert Arbon).

The draft Final Report is being submitted on 22 November. The remaining steps in the study are:

- Stakeholder Workshop on Wednesday 30 November.

- Training workshop and final hand-over of the models Thursday 1 December.

The Final Report will incorporate comments and feedback from the Workshop and any other comments that have been received. Please send critical comments and feedback to peter.robinson@eca-uk.com If you would prefer to send comments in track change form, please let us know and we will send you the Word version of this document.

## 1.4 Some issues raised in national level discussions

A number of issues raised in earlier discussions are summarised in this section. At the Launch Meeting on 30 August 2011, key issues which were raised in the discussions were as follows:

- **Water as a human right:** *How water as a human right is to be reflected in the tariff study.*

  In answer to this question from IWSD, the Permanent Secretary said that there was no direct link, but this did not detract from Government's acknowledgment of water as a human right. Water, sanitation and hygiene education are needed together in order to realise the health gains from investments in the water and sanitation (W&S) sector. Government is considering adding a small levy to water tariffs to fund hygiene education on a national scale.

- **Ring fencing of water revenues:** *Whether tariffs being set to fully recover costs of W&S services and mention of greater 'autonomy' in the terms of reference (TOR) should be taken to imply that water revenues should be ring fenced.*

  Water revenues have traditionally been used to fund municipal services outside of the W&S sector. This issue is bound up with the way local government is to be financed in future. It was pointed out that if the municipalities are to be financially self-reliant, then if water revenues are to be kept for the water sector, rates and other charges would have to be raised.

- **Blend pricing of water:** *Whether the national blend price for raw water is to be maintained.*

  The presentation had suggested that the blend price had to go. ZINWA responded that the blend price needs to be understood in its historical context. It is difficult to see it being replaced by site specific pricing without a system of targeted subsidies being in place.

- **Water sector regulatory institution:** *Which of the available institutional options for a water sector regulator would be best suited to Zimbabwe's needs.*

The Ministry pointed out that while the Medium Term Plan talks of the establishment of a Water and Sanitation Regulatory Commission, the institutional form was still being debated in Government and the tariff study could usefully feed information into the debate. Field visits were being undertaken: the first of these was to the multi-sector regulator in Ghana (Public Utilities Regulatory Commission of Ghana, PURC). Others being planned are the stand-alone water services regulator in Zambia (National Water and Sanitation Council of Zambia, NWASCO) and the regulation from within government structures in South Africa.

- **Two part tariffs:** *Whether the fixed element in current water tariffs should be replaced by a purely volumetric tariff.*

  Having a fixed monthly component in the tariff is supposed to provide revenue to cover the underlying fixed costs of a utility. In contemporary Zimbabwe, there is considerable resentment and lack of payment from customers who continue to be billed the fixed monthly charge when there is no water available, so their volumetric charges are zero. To avoid this problem, in the recent tariff award in the electricity, the fixed charge has been rolled into the energy charges. The merits or otherwise of doing the same thing in the water sector needs to be addressed in the tariff study.

The ring fencing issue has also been discussed with the Ministry of Local Government and with the team assisting in the preparation of a new National Water Policy. There are a number of issues of common concern that cut across the tariff study and the policy work, including policy on the financing of local authority recurrent and investment expenditure. Restoring a situation where municipalities are able to borrow to finance investments would have many advantages, but one consequence would be that cost-reflective rates for non-water services and full cost recovery tariffs for water and sewerage services would be necessary.

## 1.5 Perspectives of Municipalities on key policy issues

During the meetings held with the Municipalities in both August and November, they were asked to comment on the issues raised in the Launch Workshop. The views of the Municipalities were remarkably uniform on these issues and are summarised below.

- **Water as a human right:** Some Municipalities have introduced a free water allowance as the first 'lifeline' block in the tariff structure. Bulawayo, for example, now offers its domestic customers the first 5 $m^3$ of water each month as a free allocation. Tariffs for other customers have had to be raised to cover the costs of the free allocation.

- **Ring fencing of water revenues / formation of separate W&S companies:** In Zimbabwe's urban centres, the idea of water and sewerage departments being embedded in the municipalities, and of W&S often (though not always) cross-subsidising other municipal

services, is deeply entrenched. It is a system that has worked well in the past for municipal development and the municipalities generally see it as the way of the future.

The reference to greater autonomy in the tariff objectives for this study ("financial and managerial autonomy of service providers"), begs the question whether it is the autonomy of the municipalities or the autonomy of the W&S departments that is at stake. The Municipalities are jealous of their autonomy and assert that their position is much more autonomous than their counterparts in other countries. With the notable exception of Harare, they see suggestions of (a) spinning off W&S and (b) establishing a national regulator as threats to their autonomy.

The Municipalities argue that ***autonomy of the Municipalities*** is important *inter alia* for their financial standing. The Municipalities would like to be able to borrow to cover all sorts of investments, not just W&S, but their ability to do so will depend on having its main revenue earner (water) remaining part of the financial structure to be presented to government, the banks and money markets when they seek to borrow.

Central Government has in recent years required Urban Local Councils (ULCs) to take on responsibilities without providing the resources for them to do so. The view of some of the Town Clerks is that decisions about the urban water sector should await the status of urban local authorities, and their entitlement to a share of national revenues, being unambiguously established in the new Constitution.

The exception to the above is the capital city, which has already created an autonomous department, Harare Water, which is intended to operate as an entity that is separate from the Harare Municipality. The borrowing powers of the Municipality for non-water activities is to be bolstered by a number of income-generating divisions and projects, including solid waste management, electricity from sewage and landfill methane, cattle ranching etc.

- **Blend pricing of water:** The Municipalities which purchase raw water from ZINWA consider the current price to be high. They would want to be convinced of the necessity for any increase in ZINWA's raw water price.

- **Water sector regulatory institution:** The Municipalities admit to limited awareness of the potential role of a W&S regulator, but from what they know of regulators in Zimbabwe they are sceptical about the value of creating a new institution and fearful about the costs and the restrictions that this may imply. Municipalities do not want to be regulated from the capital – they want to be accountable directly to the people they serve. W&S departments see it as relevant that they be regulated by the elected Municipal Councils.

- **Two part tariffs:** An instruction has recently been issued by the Ministry of Water that customers who do not receive water should not be faced with a monthly fixed charge. The Municipalities generally see the reason for this instruction in the current situation, but would generally prefer to return to a two part tariff when normal supply conditions are achieved in the future. The fixed monthly charges provide what is seen to be a necessary financial back-stop.

## 1.6 National workshop themes and issues

The national workshop held on 5 December 2011 covered all of the main themes of the study, and included presentation of the full set of quantitative results from the comparative analysis of the W&S performance of the 7 Municipalities. The main issues raised in the discussions revolved around:

- ***Ring fencing*** – the extent to which W&S revenues should be used only within the W&S sector. There was broad agreement on the principle of ringfenced accounting, that is proper cost accounting of W&S and transparency about the transfer of revenues to other municipal functions, but less certainty about the feasibility of full ringfencing (all W&S revenues earmarked for W&S purposes only).

  Other ways of financing non-W&S services within the municipality would have to be found before full ringfencing could be implemented and the people living in urban areas would need to understand and accept the new financing mechanisms.

  The most extreme form of ringfencing would be the 'unbundling' of the W&S department from the municipality and its registration under the Companies Act. At the present time only Harare is in favour of moving towards the unbundling option.

- ***Regulatory options*** - Municipalities are concerned about having to give up some of their autonomy and answerability to their citizens if a centralised regulatory agency were to be set up, whether this be on a sector-specific or on a multi-sector basis (with other regulated infrastructure sectors such as energy and telecommunications).

  An alternative would be to have a regulatory framework embedded within central and local government, with no stand-alone regulatory institution being created.

There are significant pros and cons to each of these sets of alternatives. No clear cut, unambiguously superior and universally applicable option is available either for ringfencing or for regulation. The Workshop requested that tables of pros and cons of the different options be provided to inform the continuing national debate. These tables are included in the report in Section 6.2.

## 1.7 Quick win strategies

The Workshop noted that there are some 'quick win' strategies which W&S departments should seek to pursue vigorously. Funding these may require temporarily curtailing the transfers that are normally made from the W&S accounts to other municipal departments, but the effect of the relatively small investments involved will be to significantly boost W&S revenues.

The most obvious and generally applicable example is to replace defunct meters. People with broken meters who are receiving water are charged on a fixed estimated amount and are often using much more than the assumed volume they are charged for. At the same time, people not getting water are unwilling to pay monthly fixed charges. Replacing meters and returning to properly constituted volumetric billing is likely to result in a sharp reduction in non-technical losses, allowing the saved water to be delivered to customers presently denied supplies, and thereby further extending the revenue base.

In several municipalities, there are plans to replace broken or missing meters with prepayment meters, thereby eliminating the problem of ex post revenue collection and the associated low revenue collection efficiency which is prevalent in current conditions.

Besides metering, there are other municipality-specific quick win options which should also be investigated and pursued. Building on the quick win experience and the African Development Bank and other investment projects which are about to take place, medium and long-term prioritised investment plans are to be drawn up.

## 1.8 Report structure

The rest of this paper is structured as follow:

- **Section 2** describes the existing institutional and legal framework for urban water supply and sanitation, including tariff-setting, and discusses affordability.
- **Section 3** discusses methodologies for water and wastewater tariff setting, highlighting the approach adopted in this study.
- **Section 4** gives the technical background and presents water and wastewater tariffs for the 7 Municipalities under this study, together with explanation of the tariff model used.
- **Section 5** provides information on alternative institutional frameworks for review and approval of tariffs and the roles and responsibilities of W&S regulators
- **Section 6** provides the team's recommendations and analysis of the pros and cons of ringfencing and regulatory options.

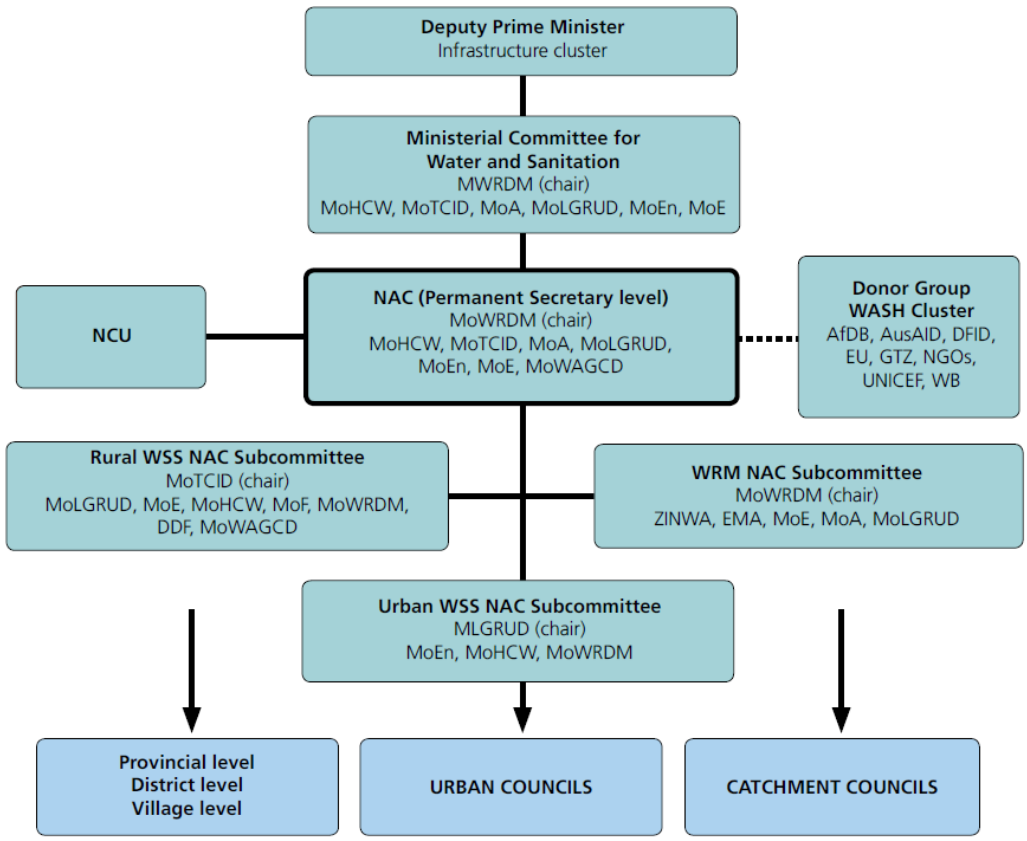
# 2 Institutional and legal framework for urban water

## 2.1 Rationalisation of the Water Sector

During the 1990s, government embarked on an institutional reform of the water sector to bring it into line with the new political dispensation for equity and justice in the sector. While the institutional reform included production of a Water Policy, this was not completed. The Government of Zimbabwe is now in the process of formulating a comprehensive Water Policy. The Water Policy will be a set of government commitments on water, providing clear guidelines on actions to be taken by the variety of actors and stakeholders.

The institutional structure, after extensive discussions, has recently been changed – see Figure 2. The Government of Zimbabwe agreed from June 2010 to consolidate the water sector though a National Action Committee on Water, looking at all aspects of water in both rural and urban areas as well as water resources management issues.

**Figure 2: Water Sector Institutional structure**




*Source:* AMCOW Country Status Overview, Zimbabwe, 2011

The Government decided to transform and enhance the existing National Action Committee on rural water supply and sanitation (RWSS) which had hitherto focused on rural areas only. The new NAC has three subcommittees each looking at specific issues:

- ❑ Rural Water Supply and Sanitation Sub Committee,
- ❑ Urban Water Supply and Sanitation Sub Committee and
- ❑ Water Resources Management Sub Committee.

The NAC now comprises Permanent Secretaries from relevant Ministries chaired by the PS Water Resources Development and Management. Above the NAC is the Ministerial Committee for Water and Sanitation.

## 2.2 Legal overview

Water in Zimbabwe is governed by a particular Act of Parliament under the Minister responsible for Water resources. There is no specific water policy in place, though one is in the process of being formulated now. However, various laws and regulations govern how the resource is used and shared. The ***Water Act Chapter 20:24*** and the ***Zimbabwe National Water Authority Act (ZINWA Act) Chapter 20:25*** are the main pieces of legislation governing water issues in Zimbabwe.

These laws are described in more detail in a later section. There is need first to identify what is meant by 'urban'. Urban areas are distinct spatial areas defined by law and governed by specific statute operating as the second tier of government. The governing legislation, the ***Urban Councils Act Chapter 29:15***, is premised on a decentralization framework (though no specific decentralisation policy exists) that devolves and delegates responsibilities to elected urban councils. Urban entities are themselves not homogeneous but vary in terms of population, area coverage, and management framework ranging from cities, municipalities, towns, and local boards in descending order. Urban areas are different from rural areas and their local governments are governed by different Acts of Parliament.

## 2.3 Zimbabwe's local government system

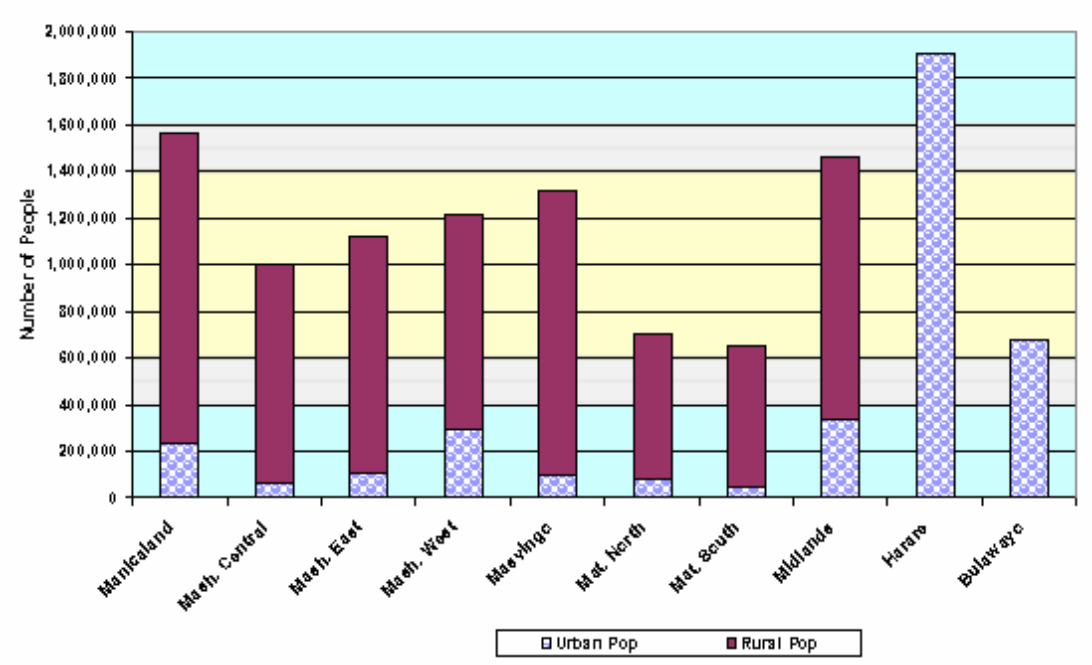
Zimbabwe has a local government system (Rural and Urban) based on Statutes (Acts) passed by Parliament. In other countries, the relationships between central and local governments are usually defined through the Constitution (examples being South Africa and Uganda) or through a specific policy statement on decentralisation. In many countries both are in place: constitutional provisions for local government and policy statements on decentralisation are translated into Acts of Parliament consistent with the two documents. In Zimbabwe, urban centres as defined in the Urban Councils Act include cities, municipalities, town councils, and local boards. Table 1 shows the national distribution of urban areas.

**Table 1: Urban Councils in Zimbabwe by category**

| Number | City | Municipality | Town | Local Government Area/ Local Board |
|---|---|---|---|---|
| **1** | Harare* | Chitungwiza* | Shurugwi | Ruwa |
| **2** | Bulawayo* | Chegutu* | Rusape | Hwange |
| **3** | Mutare* | Chinhoyi | Chipinge | Epworth |
| **4** | Gweru | Marondera | Chiredzi | Chirundu |
| **5** | Kwekwe* | Victoria Falls | Norton | |
| **6** | Kadoma | Kariba | Zvishavane | |
| **7** | Masvingo* | Gwanda | Karoi | |
| **8** | | Bindura | Gokwe | |
| **9** | | Redcliff | Beitbridge | |
| **10** | | | Chivhu | |
| **Total** | **7** | **9** | **10** | **4** |

*Cities and Municipalities in the Urban Water Tariff Study

**Figure 3: Urban and Rural Populations in the 10 Provinces 2003**




*Note*: The seven Municipalities under the study are from five provinces (Manicaland, Masvingo, Midlands, Harare and Bulawayo).

Urban local government in Zimbabwe can best be understood through an appreciation of the historical context. Prior to independence in 1980, there was no Constitutional provision for local government neither was there a policy statement. The Acts of Parliament governing local governments clearly showed different interpretations of what was expected within the existing discriminatory practices. The then Urban and Rural Councils Acts were modelled on highly decentralized system of local governments as these two Acts covered white dominated areas. The

African Councils Act was in place for African areas. The African Councils Act was not even administered by the Minister of Local Government but by the Minister responsible for Internal Affairs, a Ministry established to control the disenfranchised majority.

Post independence, government has invariably made efforts to remove the racial connotations imbedded in the laws and practice of local government. This has been done largely through giving more power to the Minister to be able to intervene appropriately on behalf of the disadvantaged African populations in urban areas. In the absence of constitutional provisions or policy of decentralization, post independence urban local governments have progressively lost aspects of their autonomy to the Minister of Local Government. The vibrant multiparty democratic system in the post 2000 era has also ushered in a completely new scenario for urban local government, becoming more contested and functions and responsibilities of local and central government coming into focus. The need for greater clarity on urban tariff setting is one important aspect and this forms an important backdrop for this study.

## 2.4 Legislative framework

### 2.4.1 Water legislation

The ***Water Act*** of 1999 largely addressed the then grossly inequitable access to water for productive purposes. The Act changes ownership of water, which is now vested in the President, and does away with private ownership and water rights in perpetuity. It ensures access to water for primary purposes to all - specifically it gives key functions of the Minister responsible for water "to ensure the availability of water to all citizens for primary purposes and to ensure the equitable and efficient allocation of the available water resources".

In terms of access, the Act states that it "shall be the duty of the Minister to secure the provision of affordable water to consumers in underprivileged communities and to promote efficiency and economy in the utilization of water resources and to encourage the use of water saving technologies". It is not very clear in the Act how the Minister of Water resources is supposed to do that especially in urban areas where water provision lies with the urban councils under a Minister of Local Government. In practice however, the Minister of Local Government has taken up the challenge of securing "***the provision of affordable water to consumers in underprivileged communities***" even though this is not specifically directed in the Urban Councils Act.

Access issues would be addressed through a decentralized system of catchment councils and sub catchment councils under the overall supervision of the Zimbabwe National Water Authority (ZINWA) established under the ***ZINWA Act***. ZINWA now owns of all the commercially used water in the country in all the government dams. The Water Act empowers catchment councils to ensure equitable distribution and use of water by limiting water which can be abstracted by any person or class of persons.

The ZINWA Act allows ZINWA to fix charges for the sale of raw water from dams and/or treated water from water works operated or controlled by the Authority. Charges, however, have to be approved by the Minister responsible for water. The Minister's approval is based on consideration of the cost of providing, operating or maintaining the service concerned, proposed improvements, and other relevant economic factors. ZINWA is the major vendor of raw water to municipalities under this study and therefore determine to an extent the primary cost of water to urban consumers.

ZINWA has had a blend price system for raw water, one for the agricultural purposes and the other for urban, industrial and mining uses. The intention of the blend price system is to ensure that costs of water from dams built for newer and smaller communities is not too high, but there have in the past been perverse side-effects of a price not related to costs, impacting particularly on urban investment decisions.

### 2.4.2 Environmental legislation

The purpose of the ***Environmental Management Act (20:27)*** is to provide for the sustainable management of natural resources and protection of the environment; the prevention of pollution and environmental degradation. Water is a major natural resource whilst waste water can be a major polluter causing environmental degradation: hence the importance of this Act in water and waste water issues. Tariff issues need to take cognizance of environmental management issues as well.

The Environmental Management Act, which is administered by the Minister of Environment and Tourism, establishes an Environmental Management Agency whose function in part is to establish criteria and procedures for the measurement of water quality. It recommends minimum water quality standards for different uses: drinking water, water for industrial purposes, and for agricultural purposes.

Waste water has a direct impact on the environment and is therefore to be regulated and monitored. The Environmental Management Act has sections on the environmental impact of waste water and sets out regulations for waste water disposal. Penalties are set for those who fail to meet the legal requirements. Both ZINWA and urban local authorities have to work closely with the Ministry of the Environment and Tourism on waste water issues.

### 2.4.3 Public health legislation

The ***Public Health Act (15:09)*** gives power to the Ministry of Health to ensure good health for all Zimbabweans. Part V of the Act requires all local authorities to provide and maintain a sufficient supply of wholesome water for drinking and domestic purposes. The Public Health Act , together with the Urban Councils Act, compels owners of properties within the local authority area to be connected to the municipal system and implores the local authority to make fixed charges for water. The Public Health Act even considers independent water utilities as being required to perform similar functions to a local authority in respect of drinking water quality.

Any water works constructed by a local authority requires the approval of Minister of Health. The Act requires the local authority to maintain water works to provide good water, with provision given for inspection by Ministry officials. Performance indicators of local authorities in water provision will necessarily require reference to the quality findings documented in Ministry of Health inspection reports.

### 2.4.4 The Urban Councils Act

The ***Urban Councils Act (29:15)*** provides for the establishment of municipalities and towns and the administration of municipalities and towns by local boards, municipal and town councils. It also provides for the conferring of town and city status on growth points, municipalities, and towns. It also confers functions and powers and imposes duties upon municipal and town councils and local boards.

Powers of urban councils are listed in Section 198 and the Second Schedule. Schedule 3 of the Act stipulates the areas in which councils can make by-laws governing the urban local authorities.

The Act confers powers of municipal and town councils in regard to sewerage and drainage as well as in relation to water supply and to preparing estimates in relation to these functions as well as preparing separate income and expenditure accounts as may be necessary, … "or if the Minister so directs, balance sheets that reflect a true and fair view of (iii) the water account". However, there is no specific directive in the Act for councils to open a separate Water Account, as is required for Housing Account, Capital Development Fund or Estates Account.

Under the Act, an urban council has the right to require every house owner in the council area to connect to council's water supply for purposes of taking supply of the water. However, the Act does not require the house owner to use the water to the exclusion of any other sources of water e.g. ground water.

### 2.4.5 Legislative framework for groundwater

Ground water sources in both low density and high density suburbs (boreholes) are not captured in the Urban Councils Act. Authority to sink boreholes in any area is sought from the Catchment Council only if water is not for primary purposes. The Water Act allows any person to abstract water for primary purposes[2]. Only the Catchment Council of an area has the power to limit quantity of water abstracted for primary purposes. The municipal councils have no such power. The Catchment Council can do so only through a publication in the Gazette, but no such limits have been published.

Water vendors in Harare, for example, extract large quantities of water from boreholes for vending, seemingly without any regulation. Underground water

[2] Primary purposes in relation to use of water means reasonable use for (a) basic domestic human needs in or about the area of residential premises; (b) for the support of animal life other than fish in fish farms or animals or poultry in feedlots; (c) for making of bricks for the private sue of the owner, lessee or occupier; or (d) for dip-tanks.

usage increased across many urban areas in both high density and low density areas for various reasons during the past ten or so years. The collapse of the economy meant local councils due to high inflation could not meet demand as billing could not match the inflation rates. Moneys collected were meaningless in relation to running costs. Quality of water deteriorated drastically whereby consumers were exposed to unsafe water delivered by councils. In some areas water was never available anyway. In the end individuals, companies and non-governmental organizations stepped in to avert the crises especially after the serious cholera outbreak of 2008 by sinking boreholes for potable water.

The Urban Councils Act under the Third Schedule does allow councils to make by-laws in relation to wells and boreholes subject to the Water Act. Councils are allowed to prohibit or regulate (a) the sinking, construction and extension of wells and boreholes; and (b) the use of water obtained from wells and boreholes; and (c) the interconnection of any well or borehole with the water mains or water supply of the council. City of Harare has by-laws dating back to 1951 which have not been amended to meet the New Act and new conditions and environments. The by-laws stipulate requirements for residents to seek authority to sink wells or boreholes within certain boundaries and not to connect these to the existing systems carrying municipal water.

### 2.4.6 The Public Financial Management Act

The ***Public and Financial Management Act (PFMA) Chapter 22:19*** of 2009 is an Act for the control and management of public resources (all public resources) and the protection and recovery thereof. It provides for the regulation and control of public entities (Part V). Local authorities including urban councils are in the Act defined as public entities and therefore accounting authorities (Section 41).

The Act gives fiduciary duties to urban councils including disclosure to the appropriate Minister all material facts (Section 42). Section 47 stipulates that a local authority is required to submit a budget to the appropriate Minister for approval, something not mentioned in the Urban Councils Act where the Minister is supposed only to receive the budget. It is not clear whether the PFMA overrides the Urban Councils Act in respect of approvals. It is, however, the case that the PFMA requires submission of financial reports by urban councils to both the appropriate Minister and to the Treasury.

## 2.5 Water tariff setting

Urban water tariff setting is premised on a number of legal instruments, Acts of Parliament, subsidiary legislation or regulations and in places directives from respective Ministers for Water and Local Government. Section 8 of the ***ZINWA Act*** allocates the function of water pricing to the Authority. It also allocates the function of encouraging and assisting local authorities to discharge their functions with regard to the development and management of water resources in areas under their jurisdiction in particular the provision of potable water and the disposal of waste water. Section 30 of the ZINWA Act sets water and other charges. ZINWA is

empowered to fix charges for the sale of raw or treated water from water works operated or controlled by the Authority. The charges by ZINWA should be approved by the Minister of Water after putting into consideration various factors. There is no reference to consultations with users of water or water costs in relation to full cost recovery for the dams from which the water is extracted. There is no consideration at this level as to the ultimate cost of water for the users, especially the urban vulnerable groups.

The ***Water Act***, Section 6, under the General Functions of the Minister states that it "shall be the duty of the Minister of Water Resources to secure the provision of affordable water to consumers in under privileged communities". Under the ***Urban Councils Act*** Part XIII, the powers of the council in relation to water include entering into agreements for the purchase and sale of water. It is not clear whether there is any agreement between the urban councils and ZINWA on the pricing of raw water and the method of calculating price of water to consumers to satisfy the legal requirements of the Minister of Water Resources to meet the provision of affordable water to consumers in under privileged communities.

As alluded to in Section 2.3, the post-independence ***Urban Councils Act*** has progressively been altered, in part to deal with challenges from inefficient and increasingly ineffective as well as the reduced accountability/transparency of urban councils. In short, councils have over time been perceived as not representing the interests of their electors. The Minister has increased his oversight powers to intervene. These changes have usually been promulgated as regulations and not amendments to the Act, using especially Part XXI of the Act under General. There are provisions that inadvertently undermine the powers and duties of councils through many open powers being delegated to the Minister of Local Government. The following provisions are notable:

- Sections 311, 313, 314 give the Minister power to appoint investigators: "if he considers it necessary or desirable in the public interest to appoint one or more persons as investigators. Councils are required in terms of this directive to comply without fail.

- The Minister is also empowered to appoint a Board to hear objections by the council (Section 312). The council is required to meet the costs of that Board.

- Under Section 313, the Minister can give directions in matters of policy.

- In terms of Section 314, the Minister may reverse, suspend rescind resolutions decisions etc of councils.

This last section has been mentioned by Municipalities during this study as seriously undermining any tariff structures agreed to between councils and their residents. The Minister, for political or other reasons may scale down justifiable tariffs in line with cost recovery objectives, thereby undermining service delivery and maintenance and water production capacity.

The Urban Councils Act does not mention systems for fixing water tariffs. Municipal councils are required to balance their budgets with the general consent of their residents. However a number of regulations and directives by successive Ministers of Local Government since independence have defined priority areas for high density areas on issues of affordability especially the minimum charge. Most recently in April 2011, the Minister of Local Government, Government with the concurrence of the Minister of Water Resources, slashed the price of water for Harare. Harare's high density fixed charge was reduced by the Minister's directive from $7 to $5 and for low density from $13 to $11. This was done after the City budget had been approved and three months into the financial year. There is presently no independent regulator to whom both the municipal council and the Minister can refer any contentious issues.

## 2.6 Affordability

In recent years, there have been few studies of household income and expenditure. One exception is the Zimbabwe Vulnerability Assessment Committee (ZimVAC) Report, entitled ***Urban Livelihoods Assessment Report April 2011***. This is based on studies of vulnerable households in a sample of urban areas which included the seven Municipalities in this study, as shown in Table 2.

**Table 2: Urban vulnerability assessment sample frame**

| Province | Urban Areas | # of HHs |
|---|---|---|
| Harare | Harare High Density, Chitungwiza, Epworth, Harare Peri-urban | 383 |
| Bulawayo | Bulawayo High Density | 255 |
| Mashonaland Central | Bindura, Trojan Mine, Glendale, Mvurwi, Shamva | 260 |
| Mashonaland East | Marondera, Chikomba, Chivhu, Mutoko, Murehwa, Ruwa | 244 |
| Mashonaland West | Chinhoyi. Kadoma, Chegutu, Kariba, Norton, Karoi, Mt. Hampden | 241 |
| Manicaland | Mutare, Rusape, Chipinge | 327 |
| Matebeleland North | Hwange, Victoria Falls, Lupane | 269 |
| Matebeleland South | Gwanda, Beitbridge, Plumtree | 231 |
| Masvingo | Masvingo, Mashava, Chiredzi, Gutu | 344 |

| Province | Urban Areas | # of HHs |
|---|---|---|
| Midlands | Gweru, Kwekwe, Redcliff, Zvishavane | 291 |
| TOTAL | | 2,848 |

Source: ZimVAC *Urban Livelihoods Assessment Report April 2011*

The income and expenditure results are shown in Table 3. The figures have some unexpected aspects, in that the income levels are low and households are spending up to 45% on food, yet total expenditure falls significantly short of income (implying monthly savings or transfers to rural family members) in all the Municipalities.

**Table 3: Monthly income and expenditure of vulnerable households**

| Urban Area | Income | Food exp | Nonfood exp | %Food | Total exp | Exp:Income |
|---|---|---|---|---|---|---|
| Harare | 475 | 128.83 | 231.10 | 36% | 359.93 | 76% |
| Bulawayo | 311 | 99.67 | 123.85 | 45% | 223.52 | 72% |
| Chitungwiza | 475 | 128.83 | 231.10 | 36% | 359.93 | 76% |
| Mutare | 293 | 92.46 | 114.18 | 45% | 206.64 | 71% |
| Kwekwe | 359 | 105.10 | 130.58 | 45% | 235.68 | 66% |
| Masvingo | 331 | 91.64 | 132.58 | 41% | 224.22 | 68% |
| Chegutu | 308 | 97.82 | 126.12 | 44% | 223.94 | 73% |

Source: ZimVAC *Urban Livelihoods Assessment Report April 2011*

Table 4 shows the expenditure on water as a proportion of income. If the reference point is that expenditure on water of vulnerable households should be less than 5% of their income, then there are at present 4 Municipalities in which this 5% affordability threshold is breached (Harare, Bulawayo, Chitungwiza and Mutare).

The discussion of future tariffs in Section 3 leads to a central case, which is the 'O&M Policy Scenario'. The precise description of this scenario is deferred until Section 4 – suffice to say here that the associated tariffs to be applied over the period 2012-2015 would involve either close to zero decreases (Bulawayo and Kwekwe) or increases in tariffs of up to 75% (Chitungwiza). If these tariffs were to be implemented, and incomes of vulnerable households remained static, then affordability problems would be worsened in Harare, Chitungwiza (the most serious case), Mutare and Chegutu. However, the increases can be mitigated for the poorest households through raising the level of cross-subsidy from other users. This would, however, be most difficult to do in the most serious case, Chitungwiza.

A graphical version of Table 4 is given as Figure 15 in Section 4.4.6. According to the calculations, if cross-subsidies are not increased, it would only be in Kwekwe and Masvingo that the expenditure on water and sewerage would fall below the 5% of income benchmark.

**Table 4: Affordability of water in the 7 Municipalities**

| Urban Area | Income $ per month | Present situation Water Exp | W:I | Change | O&M policy scenario Water Exp | W:I |
|---|---|---|---|---|---|---|
| **Harare** | 475 | 26.10 | 5.5% | 18% | 30.80 | 6.5% |
| **Bulawayo** | 311 | 19.86 | 6.4% | -4% | 19.07 | 6.1% |
| **Chitungwiza** | 475 | 26.10 | 5.5% | 75% | 45.68 | 9.6% |
| **Mutare** | 293 | 17.35 | 5.9% | 20% | 20.82 | 7.1% |
| **Kwekwe** | 359 | 17.53 | 4.9% | -2% | 17.18 | 4.8% |
| **Masvingo** | 331 | 12.08 | 3.6% | 13% | 13.65 | 4.1% |
| **Chegutu** | 308 | 13.37 | 4.3% | 26% | 16.85 | 5.5% |

*Note*: 'O&M Policy Case' is explained in Section 4.

# 3 Methodology for water and wastewater tariffs

The main considerations in setting a water tariff are the cost of supplying water according to the service standards required or desired by the customers, and the costs of meeting demand for water in the future. This chapter expands on this concept, providing a mix of theoretical concepts and documentation of relevant African and international experience. After the next section on tariff objectives, each of the remaining sub-sections concludes with a note about the relevance of the discussion to contemporary Zimbabwe.

## 3.1 Tariff objectives and trade-offs

Water and wastewater tariffs are important policy and managerial tools. However, the pricing of water and wastewater can be controversial and a good tariff design that meets all policy objectives is difficult.

From the TOR, the tariff objectives in Zimbabwe are to include:

- ***Full cost recovery*** – including operational and maintenance and capital costs, taking into account capital investments to increase capacity and expand the network.
- ***Financial and managerial autonomy of service providers*** – service providers can recover costs and not dependent on budget transfers from local or national government, but with the important provision of ***full accountability*** to stakeholders.
- Incentives for ***efficiency and quality improvements*** by service providers, and ***efficient use of water*** resources by customers.
- ***Affordability and transparency*** – tariff structure that has equitable cost sharing across categories of customers and transparent subsidies where these are necessary to achieve affordability
- ***Tariff adjustment procedures*** – tariff review procedures which are transparent and which allow stakeholder participation.
- ***Polluter pay*** principle for industrial waste water.

Some of the objectives mentioned above can be conflicting: for example, the objective of having a full cost recovery tariff may not meet the affordability objective, and subsidies introduced to ameliorate this will distort the efficiency objective. Trade-offs will necessarily have to be made to ensure a water tariff design that will benefit the customers and provide financially sustainability to the service provider, while being ***simple and understandable*** enough to apply in practice and be accepted by customers.

## 3.2 Economic and accounting approaches to tariff setting

In the 1980s and 1990s, international concern was growing about the implications of the past tendency, in many countries, for access to water to be taken as a divine-given right. Even in urban areas, water was supplied with little charge or no charge being levied, regardless of the cost of treating and supplying the water. Public authorities argued that the public health benefits of water greatly exceeded the costs of supply, and justified the implicit subsidy that was involved. However, as the cost of treating water increased and water sources became scarce, this approach to the supply of water become unsustainable

The recognition that water is not just a social good became the basis for a change in international thinking. An economic approach to water was codified in 1992 in the fourth Dublin Principle, which states that "water has an economic value in all its competing uses and should be recognised as an economic good". As an economic good, water has an opportunity cost, and so pricing of water should in theory be set to reflect this cost, while also accommodating the social aspects of water.

In practice, water prices or tariffs can be calculated using an accounting approach or economic approach. In the ***accounting approach***, water tariffs are designed to cover the utility's operational and maintenance (O&M) costs, capital costs, and provide some rate of return on the capital invested. The performance of the utility is measured by its net profit, return on capital, credit worthiness, etc. This approach is backward looking, taking into account the utility's historical financial performance, and using these as a base to project future performance.

In contrast, the ***economic approach*** to tariff setting takes into account other tariff objectives as well as cost recovery for the utility, such as service delivery quality, equity improvements, social and environmental sustainability, etc. The economic approach is forward looking, incorporating projected changes in water demand and the existing capacity of supply of the utility and future investments needed to meet rising demand. The full elaboration of this approach is for tariffs to be based on the long-run marginal costs (LRMCs): it is the marginal cost which provides the signal to the consumer needed to achieve allocative efficiency. These concepts are elaborated in Box 1 on the next page.

The LRMC approach is quite demanding from a data viewpoint, so there are practical limitations on its applicability. There are also theoretical problems, because marginal costs may well be less than average costs in an industry characterised by strong economies of scale, so setting tariffs purely on the basis of LRMCs may not provide sufficient revenue for financial viability[3].

[3] The LRMC approach is common in the electricity sector, but less so in water. Two regulators which require LRMC calculations are OFWAT (England and Wales) and the Essential Services Commission of the State of Victoria, Australia. Useful references on LRMC include Essential Services Commission, *Estimating Long Run Marginal Cost – Implications for Future Water Prices*, 2005 and PhD thesis by David Altmann *Marginal Cost Water Pricing: Welfare Effects and Policy Implications*, University of Adelaide, 2007.

**Box 1: Two concepts of 'efficiency'**

'Efficiency' is used in distinctly different ways in economics. There are two different interpretations of efficiency which are important in relation to water. The first is ***usage efficiency***, which refers to satisfying a need with a minimum amount of water. This is the everyday meaning of 'efficiency' and is at the heart of water demand management (WDM) programmes which seek to reduce wastage through, for example, replacing leaky pipe systems with new ones or encouraging users (in part through higher prices) to use water sparingly, or in agriculture through adopting less wasteful irrigation techniques.

The second aspect is ***allocative efficiency***, which from an economics viewpoint is often even more important than usage efficiency. Allocative efficiency refers to the allocation of resources between competing uses so as to maximise the attainment of some social goal or goals, in this case the allocation of water to maximise the socio-economic development potential of a particular catchment.

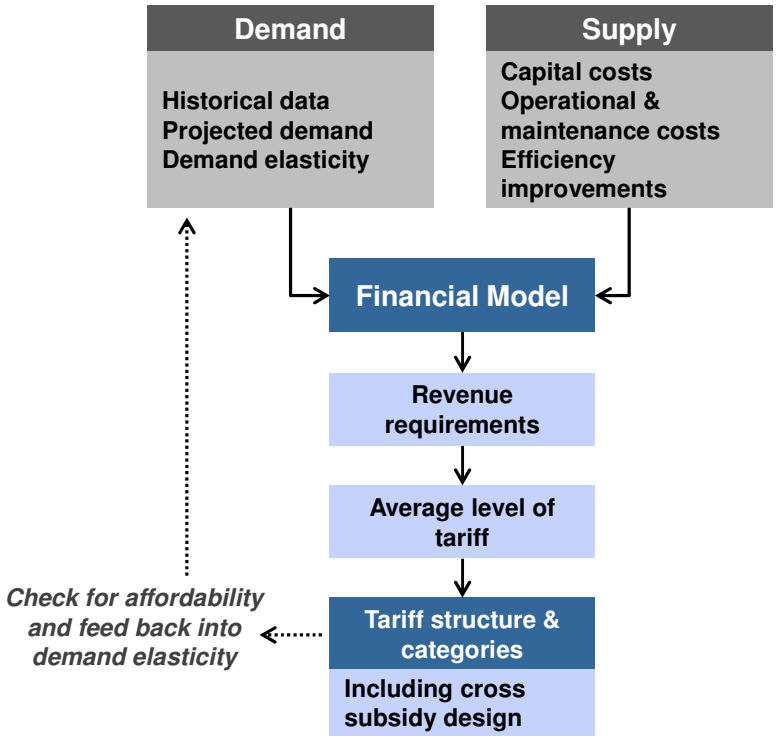
When a resource is allocated solely within a market (which is not the case for water), the price will deliver the efficient allocation of resources when it is equal to the ***marginal cost,*** which is the cost of supplying the last unit of demand. This is a future-oriented cost and is different to an average (historical) cost which is the average cost of all the units supplied up to this point over a defined period of time in the past.

Some fusion of the economic and accounting approaches is what is required. This is best achieved by retaining the forward looking economic perspective, but at the same incorporating revenue requirements dictated by the financial situation of the water and sanitation supply entity. The starting point for this approach is to compile into a tariff model the historical data and projections of water demand and the capital and operational and maintenance costs of meeting this demand, taking into account the potential for efficiency improvements by the supplier and possible elasticity effects if future tariffs are going to be much higher than those which applied when the demand forecasts were made. The projected investments should be the least cost sequence of investment projects needed to meet projected demand. **Figure 4** illustrates this practical method of calculating water tariffs.

The revenue requirements generated by the model divided by the projected sales give the average ***level*** of tariffs that is required. This cost recovery level could in principle be generated by charging all customers at a fixed flat rate per cubic metre. However, there are a number of objectives besides costs recovery which need to be taken into consideration.

Consideration of the objectives given above, including the trade-offs which are implied, allow a ***tariff structure*** to be designed. This involves defining tariff categories and making trade-offs between objectives which will typically involve some degree of cross-subsidy between customer categories.

**Figure 4: Practical water tariff calculation methodology**




***Relevance for Zimbabwe:*** The practical approach captured in Figure 4 is appropriate and useful, and is the basis for each of the models which have been constructed for the 7 Municipalities. This is explained in some detail in Section 4.3, but in essence the models have the structure illustrated above (demand, supply and financial modules capturing the physical and the financial data, and then a tariff module which makes use of both financial and physical information).

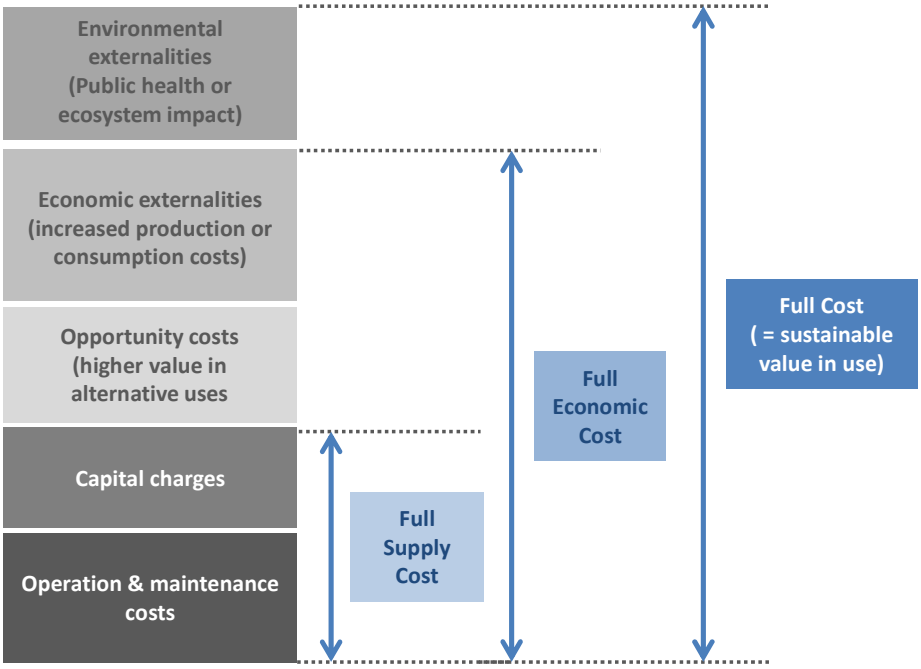
The models cover the period 2010-2016, with the tariffs being calculated as averages over the 3 year period 2012-2014 as the revenue requirement divided by the billed water. The costs are escalated by assumed levels of inflation. When projecting forward, the costs and volumes from the base and current years (2010 and 2011), the figures are adjusted to take account of planned improvements and 'policy variables' (reduced losses, increased revenue collection efficiency, higher levels of infrastructure spending and reduced transfers of water revenues to other municipal functions). Most of these factors help to reduce the required tariff level.

## 3.3 Financial viability and tariff level

A financially viable utility will be able to provide its customers with good quality service, and would be able to extend its network to increase coverage. To achieve a basic level of financial viability, the utility would at least need to be able to recover its operational and maintenance costs, but would then depend on outside financing for its capital cost requirements.

Progressively more comprehensive degrees of cost recovery are shown in Figure 5. ***Full water supply cost*** covers all O&M costs and capital costs. ***Full economic cost*** includes opportunity costs (costs imposed on other potential users due to use of the water) and net economic externality costs (positive or negative production or consumption effects not captured in the price) in addition to the full water supply costs. Finally, ***full cost*** includes all of the costs previously mentioned plus net environmental externalities (including health benefits arising from people having access to clean water and environmental costs arising from the discharge of polluted wastewater). It is important to state in the tariff objective, which level of full cost recovery is set for the water utilities to achieve.

**Figure 5: Levels of full cost recovery**




Source: adapted from *Modelling a Water Conserving Tariff for Kampala Uganda*, by Ramogodi I. P. Motoma, 2007, and concepts from *Water as a Social and Economic Good: How to Put the Principle into Practice*, by P. Rogers, R. Bhatia, and A. Huber, 1998

In Kenya, tariff reforms includes distinguishing different types of water utilities according to their ability to recover costs, and tariff levels are set based on these (see **Box 2**).

**Box 2: Tariff levels in Kenya**

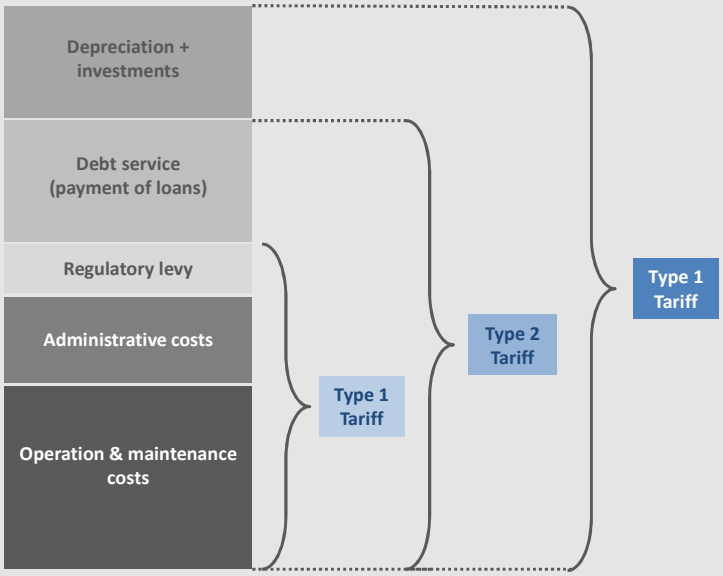
Similar to Zimbabwe, water utilities in Kenya have difficulties recovering their costs due to low tariff levels and poor performance. To improve this situation, WASREB (the independent water and sanitation regulator) has chosen a two-step tariff objective. The first step is to set tariff at a level which will cover O&M costs while at the same time improve utilities' performance. The second step is to achieve full cost recovery (recovering capital costs as well as O&M costs) in order to ensure long-term sustainability and increase

coverage.

WASREB distinguishes water utilities according to their financial performance as follows:

- ❑ Type 1: full coverage of O&M costs is not yet achieved. WASREB will allow tariff increases for Type 1 utilities in order to achieve O&M cost recovery and set performance targets for the utilities to improve service quality
- ❑ Type 2: full coverage of O&M costs achieved, but repayment of debt is pending. Tariff increases for this category is strongly tied to utilities performance levels
- ❑ Type 3: full coverage of O&M costs and repayment of debt is achieved. Water utilities in this category will have recovered 100% to 150% of its O&M costs. The tariff objective of this category is to achieve full cost recovery, which include capital costs recovery. Tariff increases for this category is strongly tied to utilities performance level, and is prioritised to increase coverage level.

The following figure illustrates the tariff composition for the three categories:




Source: adapted from *Tariff Guidelines,* Water Services Regulatory Board (WASREB)

Tariff setting in Kenya as shown in **Box 2** follows the principle of "cost-plus", where the tariff is set based on historical costs and performances. As mentioned in the previous section, the financial model developed for Zimbabwe will also include forward looking inputs, following the principles of the economic approach. Therefore, the average tariff level will be designed to cover O&M costs, administration costs, and some capital costs required to extend or rehabilitate the network.

***Relevance for Zimbabwe:*** In Zimbabwe's case, the primary objective is to ensure that at least full O&M costs are covered and capital costs at least to some degree. The inclusion of opportunity cost considerations and externalities in the tariff are something to be considered at a later stage.

For this study, it is important to note that if the apparent costs are taken as given, then setting tariffs so as to achieve financial viability may result in unnecessarily high tariffs. It is very important to adopt a proto-regulatory approach, which is to look critically at the costs which are supposedly to be recovered and the policy and institutional environment which may impact on the revenues actually available to the W&S departments to sustain their operations. This is the approach adopted in the 'planned improvement' and 'policy scenarios' (see Section 4.3).

## 3.4 Tariff structures

Once the average tariff levels are set to meet the cost recovery objective, the tariff structure can be designed to meet other tariff objectives, such as affordability and equity.

Tariff structures can involve a fixed charge, which is a fixed component that does not vary with consumption, and a volumetric charge, which varies depending on the volume of water consumed. There are different ways to calculate volumetric tariffs, such as a uniform volumetric charge, which means the customer's monthly bill is simply the amount of water consumed times the price per unit. The price per unit in this type of tariff does not change with the amount of water consumed. Another type of volumetric charge is the rising block tariff, which is a step-wise price structure, where the first block of consumption is priced lower (usually) than the next blocks.

Table 5 on the next page summarises some of the advantages and disadvantages of different tariff structures that have been considered during this study. The list in the table is not exhaustive and other hybrid or combination of tariff structure exists. For example, in Zambia domestic customer with meters are charged a rising block tariff, while non-meter customers are charged fixed charges depending on the level of consumption. In many countries in Europe, and also water-scarce countries like Australia, uniform volumetric charges are used.

One of the main requirements for volumetric charge is to have a working water meter in order to measure the amount of water consumed by each customer. In fact, problems with metering make it imperative to question whether the all but universal rising block approach in Zimbabwe should be maintained in the future.

Another form of water services charge is the connection charge, which is charged to new customers to cover the capital costs related to connecting the customer to the network. In many cases, the connection charge can be unaffordable for low income customers, as it can be quite high especially if network extension is required to connect the new customer. For example, in South Africa, connection charges are more than US$300, in Niger, Mozambique and Cote d'Ivoire it is about US$240.

This is a major problem in many urban settings, where the water utility can offer piped water services to households, but they cannot afford to pay the connection fee and hence opt out. One way to deal with high connection charge is to allow customers to pay in instalments, for example as a monthly payment within a twelve month period. Another option is to provide connection subsidies, whereby the new

customer only pays part of the connection charge. The latter will be discussed in more detail in Section 3.5.

**Table 5: Summary of advantages and disadvantages of tariff structures**

| Tariff Structures | Advantages | Disadvantages |
|---|---|---|
| **Fixed charge**<br><br>Customer pays the same monthly bills regardless of volume of water consumed | • Provides stable cash flow to service providers if set at appropriate levels<br>• Easy to set tariff levels by service providers<br>• Easy to understand by customers | • Does not send a message about the cost of supply<br>• Does not provide incentives to improve efficiency for service providers<br>• Does not provide incentive to customers for efficient use of water |
| **Uniform volumetric charge**<br><br>Customer's monthly bill is the quantity consumed times price per unit of water | • Revenues adjust automatically to changing consumption, can be cost recovery if set appropriately<br>• Easy to understand by customers<br>• Customers can limit their consumptions to meet affordability | • Does not provide strong incentive for service providers to improve efficiency<br>• Does not send clear message about the cost of supply |
| **Rising block tariff**<br><br>Customer pays low tariff up to a specified quantity, additional amount attracts higher tariffs | • If the blocks are well designed, can achieve cost recovery<br>• Cross subsidies are possible (high consumption customers covering the costs of low consumption customers<br>• Can provide 'lifeline' tariff to poor households<br>• Provides incentives for efficient use of water by customers | • Does not send a message about cost of supply to customers<br>• Can penalize poor families with large households or shared connections<br>• If upper consumption block not priced sufficiently high, may not achieve cost recovery |

Source: Adapted from *Water Tariffs and Subsidies in South Asia*, World Bank

### 3.4.1 Two-part tariff

Many utilities used a combination of fixed and volumetric charge – a "two-part" tariff - as oppose to only using a fixed charge or volumetric charge.

A two-part tariff has the advantage of enabling water utilities to achieve economic efficiency (by sending the pricing signals to customers through the volumetric charge) and cost recovery (through the fixed charge component). For example, after a completion of a large capacity enhancement project, the short run marginal cost of

raw water supply may be very low, and this could be reflected in a lower volumetric charge component. However, the low volumetric charge may not be able to recover the capital investment associated with the project. This can be recovered through the fixed charge component.

In contrast, when there is a water scarcity, such as in a drought year, the volumetric charge component can be increased to reflect the scarcity of water supply. Once the drought months are over, the fixed charge component can be used to provide rebates to customers.

### Fixed charge component

In general, the fixed component of the tariff is typically set to cover the fixed administrative costs associated with water meters, billing and collection, and some network maintenance and rehabilitation costs. The fixed charge can be set to be the same for all customer types, as the fixed administration costs is spread equally between all customers.

The fixed charge can also be set to differentiate between different consumer types, for example so that commercial and industrial customers pay a higher fixed charge compared to households. Fixed charge for household customers can be based on property value, or in Zimbabwe's case, it could be differentiated between LDA and HDA areas. Alternatively, fixed charges can be based on the size of the distribution pipe, for example, usually household supply pipes are smaller in diameter than those of commercial and industrial customers.

There are two forms of fixed charge: a monthly fixed fee and a minimum consumption charge. The ***monthly fixed fee*** is usually based on pipe size, and is used in many African water utilities including Burkina Faso, Zambia, South Africa, Tanzania, Lesotho and Madagascar. The ***minimum consumption charge*** is based on a fixed amount of consumption charged at the lowest tariff block. This method is used in water utilities in Malawi, Mozambique and Cote d'Ivoire. In Mozambique, the minimum consumption is set at $10m^3$, while in Malawi and Cote d'Ivoire it is set at $5m^3$.

### Volumetric charge component

The most common volumetric charge is the rising block tariff (also called ***increasing block tariff*** or ***IBT***). The main reason for adopting the IBT is that it allows the utility to provide water to the poor at an affordable rate for a volume designed to cover basic needs. This lower rate for the most basic amount of water is known as a 'lifeline' tariff, which is set lower than the cost of supply.

The size of the subsequent blocks of the IBT is usually set higher than the lifeline volume, at between 10m3 (used in most African and South Asian utilities) and 30m3 (for example in Nigeria). The higher blocks are charged at a rate that would generate cross-subsidies and provide incentives for efficient consumption of water. It is important that the average tariff between all consumption blocks is calculated to cover the long run costs of supply in order to meet the cost recovery objective of

the tariff. The highest consumption block will have to be charged at a rate that is often significantly higher than the cost of supply.

The merit of the IBT is based on the assumptions that:

- ❑ there is a correlation between income level and water consumption, i.e. small consumers are poor and that higher income customers consume more water;
- ❑ sufficiently high prices in the upper consumption blocks will encourage efficient use of water;
- ❑ low tariff for small customers will allow more poor households to have access to affordable clean water.

However, there are several difficulties with IBT, some of which can even result in the poor paying more per unit of water than the average customers:

- ❑ low income households may consume relatively high levels of water, undermining the assumed correlation between income level and water consumption;
- ❑ several low income households may live in a single house, and would be a single customer from the utility's viewpoint; in such circumstances the lifeline allowance is quickly overtaken by high cost water from the upper blocks in the tariff structure;
- ❑ if the size of the first block is too wide, not only the poor will benefit from the subsidies, and it may become difficult to fund the cross-subsidy because insufficient expensive water is consumed overall;
- ❑ if the price set for the highest consumption block is too high, those customers may opt out and develop their own water supply alternative, such as a well or a borehole.

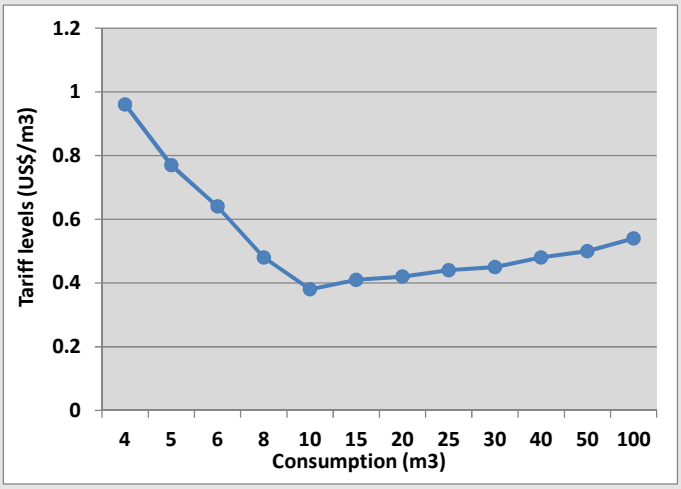
Another consideration when adopting the two-part tariff with a fixed component is that sometimes the effective unit price for lower consumption customers ends up being higher than average, as illustrated by tariff structure in Mozambique in **Box 3**.

**Box 3: Two-part tariff in Mozambique**

Water utilities in Mozambique adopt the two-part tariff structure, with a minimum consumption charge for water consumption below 10m$^3$ of US$3.83. The volumetric tariff is structured as a rising block tariff, with 3 consumption blocks. The minimum charge covers the first block; hence the volumetric charge for the first block is zero. The final consumption block of 30m$^3$ or more is charged at US$0.58 per m$^3$. Most customers are metered, with metering rate of close to 100%.

The minimum charge is payable regardless of how much the customer consumes, and therefore small customers consuming less than 10m$^3$ pay more per unit than those consuming the full 10m$^3$ or more. The graph below illustrates the average unit price per

consumption level.




Small customers consuming 4m³ pay around US$0.58 more per m³ than those consuming 10m³, and around US$0.42 more per m³ than large customers consuming 100m³.

This tariff structure sends a distorted pricing signal to customers, as it is not economical for households to consume less than the minimum threshold, as they end up paying more for consuming less.

Source: adapted from *Cost Recovery, Equity, and Efficiency in Water Tariffs: Evidence from African Utilities,* The World Bank, 2008

The volumetric charge can also be in the form of linear or uniform charge, which means the price per unit does not depend on consumption level. NWSC, the main water utility in Uganda adopted a two-part tariff that consists of a fixed charge and a uniform volumetric charge. This tariff structure is simpler and easier to understand by the customers. However, it does not provide incentives for efficient use of water, and the fixed charge component still create the same problem, in that low consumption customers end up paying higher unit price than the average customer.

There are various alternative ways to ensure that vulnerable customers are protected and receive the intended subsidies. For example, in South Africa the first block of consumption, the lifeline block, is provided free of charge as part of the government's free water subsidy (6 m³ per month per household). Further discussion of subsidy design is presented in Section 3.5.

### 3.4.2 Prepaid water meter

An alternative solution in providing water services to the urban poor is the use of prepaid water meter, or monthly prepaid card system. In several countries, the prepaid concept was introduced to provide cost recovery program for water supplied from shared or public taps, rather than for household customers with piped water supplied into their homes. In the shared tap supplies in Lesotho, South Africa and Uganda (see **Box 4**), customers buy prepaid tokens or cards, which on

being inserted in the meter allow containers to be filled from the tap up to the prepayment amount in the token.

**Box 4: Urban poor projects with prepaid water meters in Uganda**

Prepaid water meters have been installed in urban poor areas in Kampala, Uganda, since 2009. As part of the Urban poor projects in Ndeeba-Kisenyi and Kagugube areas, NWSC (the national water and sewerage company) laid over 22kms of water mains, installed 450 public water points with prepaid meters, over 100 yard taps and over 50 sanitation facilities.

Customers purchase prepaid tokens that are used to access water from the public water points. NWSC charge the usual public water point tariffs for the prepaid taps of 0.42 US cents per $m^3$.

The unit cost for installing the prepaid meter is much higher than that of conventional meters. For comparison, the unit cost of installing a yard tap is US$174, for public water points with conventional meters the unit cost is US$383, and for public water point with prepaid meter the unit cost is as high as US$1,325. To make this project financially viable, NWSC sourced donor funding, which covers 60% of costs per connection, contributed 30% of costs per connection, leaving the customers contribution to only 10% of costs per connection.

This project has been well received by the community, who accept the prepaid meter concept. The success of this project encourage more usage of prepaid meters, which include the instalment of 100 prepaid meters as part of a Global Partnership on Output Based Aid (GP-OBA) project.

Source: adapted from *NWSC Annual Report 2009-201,* and from *Pro-poor water service strategies in developing countries: Promoting justice in Uganda's urban project,* by Sanford V. Berg and Silver Mugisha, 2009

Another method for prepayment - which was successfully used in Zambia (see **Box 5**) - is by using a monthly prepaid card that can be used to obtain water from the manually operated taps. The operator will then stamp the card to indicate the amount of water obtained and the residual value in the card.

The main advantage of the prepayment method is that it resolves the non-payment problem, dramatically improving 'collection efficiency'. The price per unit can be calculated to cover the operation and maintenance of the public tap and the meter (or the operator's wages in the case of manual tap), and some of the capital expenditures. This system also allows the customer to control how much they spend on water, and it is easy to understand, as most customers will be familiar with the concept of prepaid mobile phones.

In the case of a prepaid meter system, another advantage is that water can be accessed at any time of the day, as long as the customer inserts the prepaid token or card into the meter.

However, it has been acknowledged that the prepayment method may exclude the very poor if they are not able to purchase the tokens. In Lesotho, where prepaid

meters are fitted to public stand-posts, some of the poor households are not able to connect or purchase the prepayment token, and hence have to use alternative water supplies.

Another disadvantage of the prepayment method is that the capital cost of purchasing and fitting the prepaid meter is relatively high. In some cases, this cost is borne by the utility under a grant scheme from the government or other donor agencies. In other cases, the capital costs are recovered through customer's payments, by way of a deposit (in Uganda), membership fees (in Zambia) or built into the prepaid price.

**Box 5: Monthly payment card system in Zambia**

The monthly payment card system is used in Chipata, a high density low-income compound in Lusaka. The system was designed to facilitate payments from customers, minimise misuse, efficiently collects revenue, ensure effective maintenance and create local employment.

Under this system, customers are required to pay a membership fee of 9,000 kwacha per year, which can be paid in lump sum or in instalments. To access water, customers buy prepaid monthly cards from a local committee office for 2,500 kwacha, which allows them to access seven 20 litre buckets per day per family from a communal tap, which is attended by employees who will then stamp the card to keep track of consumption.

The system is managed and operated by the community, with a Zone Development Committee (ZDC) that represents community at the grass root level and who supervise each tap's operation. The ZDC elects the members of the Residents' Development Committee, which coordinates compound-wide projects and represents the community to other government agencies.

The financial management of the system is made transparent by way of monthly reporting to the users. Two separate bank accounts are used: one for capital replacement costs and, another for operating costs and receives input from the monthly prepayments. Revenues for operating costs are used for meeting wage bill (55%), cover operating costs such as electricity, stationary etc (40%), and 5% is set aside for future development costs. In the case that the water is supplied from a piped connection from a water utility, the operator pays the rate charged by the water utility (which in most cases are the lifeline rate for public stand post).

This system was successful, with membership numbers increasing and the system replicated and used in other compounds. This shows that it is possible to have a cost recovery system for poor and low income areas. Community involvement from the beginning of the program is paramount to the success of the system.

Source: adapted from *Financing and Cost Recovery*, IRC International Water and Sanitation Centre, December 2003

***Relevance for Zimbabwe:*** In the past, Zimbabwe has had a two part tariff (fixed monthly charge plus volumetric charges) with the volumetric part having rising blocks. Two part tariffs would still seem to be relevant to lock in a basic level of monthly revenue for the W&S department, but the fixed charge has become controversial in recent years because people who have received no water for many

months do not want to be required to pay a fee every month. In the empirical work on the 7 Municipalities, we have found that different municipalities are trying different structures, but with a preference to return to a two part tariff when supplies have been fully restored.

Some municipalities are moving away from the long-cherished increasing block tariffs. As explained above, IBTs are very attractive from a theoretical viewpoint, because they offer the possibility of achieving various objectives simultaneously, notably providing a basic level of water at a low price to low income households and encouraging more efficient use of water by large consumers. However, there are problems in practice not just in designing IBTs to achieve the objectives in a targeted way but in implementing them effectively. IBTs require universal, accurate metering and efficient billing, revenue collection and customer complaint handling procedures, conditions which do not presently exist.

In most of Zimbabwe's municipalities, the proportion of customers with working water meters has declined dramatically in recent years. If major investments are to be made in customer meters, it would certainly be relevant to consider the purchase of pre-payment meters which effectively raise the revenue collection rate to 100% for those with meters (only exception being dishonest customers who bypass or tamper with the meters). Harare, Bulawayo and Chegutu are all due to introduce prepayment meters in the near future.

Although prepayment meters (PPMs) have in the past been much more costly than conventional meters (see **Box 4** above), the price differential is narrowing and is anyway dwarfed by the savings in eliminating bad debts and the associated costs of collection and eventual write-offs. Lower cost prepayment meters can only support fixed volumetric tariffs, but more sophisticated meters can accommodate rising block tariffs. There are significant up-front costs in the software and the training of staff, but thereafter the costs of the meters should not be a barrier. Chegutu cited $65 for a PPM as compared with $50 for a conventional meter. Bulawayo seeks to have IBT meters and have been quoted $200 for a household PPM and $1,220 for a robust communal PPM.

As regards IBT structures, in the past most municipalities had multiple blocks for all tariff categories. This appears to us to be dysfunctional, and it seems the municipalities agree, and have already opted for 3-4 blocks in most cases. A 3 block structure should be adequate for the volumetric charges for domestic customers (lifeline amount, middle block and upper block). For non-domestic, we suggest a fixed volumetric charge, with different levels for commercial/government and industrial categories.

This simplification has advantages for both the suppliers and the consumers. The simple structures will allow municipalities to estimate revenues arising from different block levels, even in the absence of the detailed volume-per-block data that should ideally be available. More importantly, simple structures have a better chance of being understood and responded to by the customers. Since the objective of rising block tariffs is to provide incentives which affect customer behaviour, customer understanding and appreciation of the tariff structure is essential.

## 3.5 Subsidies and other adjustments to meet broader objectives

As mentioned earlier, subsidies can be designed into the tariff structure in order to meet broader objectives, in particular affordability and equity objectives. Some factors need to be taken into consideration when designing water tariff subsidies:

- ***What is the objective of the subsidies?*** Different types of subsidies can designed for different purposes, therefore, it is important to have a clear objective for providing subsidies.
- ***Who are the beneficiaries?*** To be effective, subsidies need to be well targeted, with the beneficiaries clearly identified.
- ***Who will finance the subsidies?*** Subsidies can be financed by the government (national or local levels), donor agencies, the utility, or other customers. Transparency is important.
- ***To what extent will the subsidies distort incentives?*** For example, very low tariff or free water may encourage wastage by customers; direct cost subsidies to utilities may discourage efficiency.

The following subsections discuss these key issues in more detail.

### 3.5.1 Objectives of the subsidy

The types of subsidy should reflect the objectives of the subsidy programme. In the case that the objective is to increase coverage and to provide access to poor households, the subsidy should take the form of an access subsidy, which is a once-off capital subsidy paid as an offset to the connection charges which new customers would otherwise have to pay.

In many cases, poor households cannot gain access to water connections due to the high up front connection charges associated with the capital costs required to extend the network to the area or households, and not because of the cost of water itself. Without access to piped water supply, in many countries poor households pay higher per unit prices for alternative sources, such as water from tankers or water vendors. Therefore, by providing subsidies to connect to the network, poor households will be able to access safe water supply at a lower per unit price, and will be able to access other forms of subsidies (for example the lifeline tariff for low consumption).

An advantage to the access subsidy is that it is a one-off commitment, as it pays for the capital cost of the new connection. The government will only have to pay the subsidy for every new connection once. Another advantage is that this form of subsidy can be designed to be performance based. For example, the subsidy can be output based, that is, paid to the utility once a certain number of connections are made. This will provide incentives for the utility to increase coverage and connect more households in order to receive the subsidy.

However, if the utility already has high rate of coverage and the policy objective is to provide affordable water supply, then the subsidy can be provided in the form of consumption subsidy. This type of subsidy is on-going and is designed to lower the tariff level for a certain group of customer. The most common consumption subsidy is a cross-subsidy between customer groups, which is discussed in more detail in Section 3.5.3.

### 3.5.2 Identifying and targeting beneficiaries

It is important to identify the beneficiaries of the subsidies in order to be able to target the subsidies to those who need them the most. Identifying subsidy beneficiaries is not easy and at times could be time and budget consuming. In general there are several indicators that policy makers use to identify and target subsidies:

- **Income level** – if there are accurate and reliable information regarding household income levels, then the subsidies can be targeted to those households earning below a certain income level. This information is sometimes available when there are other social and/or pro-poor programs in the area, such as health care benefits or food stamp program. However, if such information is not available it is difficult to gain accurate information regarding income levels, especially in a country where the informal economy plays an important role for poor households.

- **Consumption level** – consumption level, as measured by expenditure, is often used as a proxy for income, and may be more accurate than income when the data relies on self declaration, as willingness to reveal expenditure is often higher than about income and some important sources of income (such as remittances) may anyway be overlooked. Subsidies are then targeted to households with low consumption levels.

- **Geographical areas** – in some cases, subsidies can be targeted to a certain types of households through their location, such as occupants of council flats or public housing, or to certain geographical areas that are identified as low income areas.

- **Self-targeting** – tariff structures can be designed so that customers can self-select themselves into the subsidised category. For example, utilities can offer customer household connections or yard taps or stand pipe connections for lower tariffs. Another way is to offer a menu of tariff structures for a given service level. For example, a "high volume" tariff with a high fixed charge and low volumetric charge, or a "low volume" tariff with a low fixed charge but higher volumetric charge.

These targeting methods are not mutually exclusive and can be used in conjunction with each other. If subsidies are not well targeted, subsidy funds can be used inefficiently and the poor households will end up losing out in the provision of clean and save water supply services.

### 3.5.3 Sources of subsidy fund

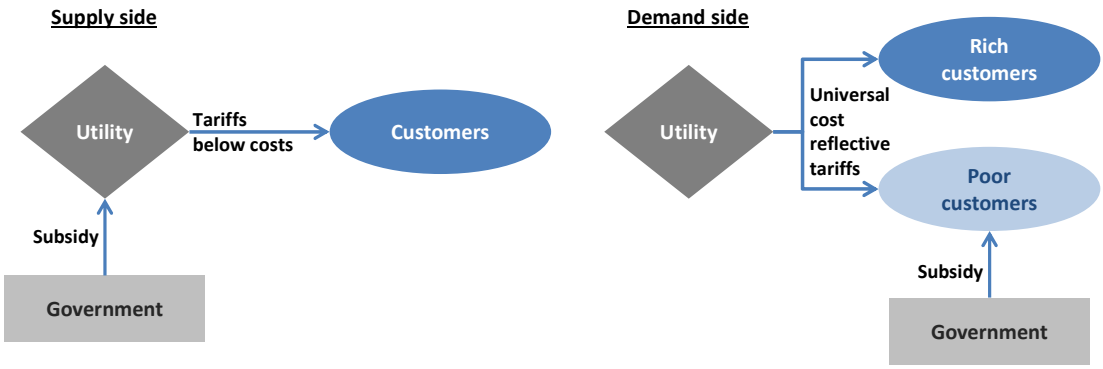
There are two main ways in which subsidies can be financed: by using government, donor agencies or other external entity funding (***direct subsidy***), or by charging above cost level tariffs to some groups of customer in order to subsidise lower income customers (***cross-subsidy***).

#### Government or donor agency funding – direct subsidy

Direct subsidies can take the form of supply side subsidies, whereby the government or donor agency provides funding to cover the deficit between the cost of supply and the tariff revenues by transferring the funds directly to the utility. The subsidy is passed on to the customers by way of tariff levels which are below the costs of supply. There are clear disadvantages of using the supply side direct subsidies, such as the utility does not have the incentive to reduce costs and increase efficiency, since any deficit will be met through the subsidy. Moreover, the subsidy covers all consumers, including non-poor households, so is not properly targeted and is in that sense wasteful.

Another form of direct subsidy that better targets the poor households is the demand side subsidy, whereby the government transfers the funds to cover the deficits directly to the poor households. However, this type of direct subsidy may entail high administration costs in identifying and making regular payments to the low income households. Figure 6 illustrates the difference between supply side and demand side direct subsidies.

**Figure 6: Schematic diagram of direct subsidies**




Source: *Water Tariffs and Subsidies in South Asia*, World Bank

As the source of funding for direct subsidies are governments or donor agencies, the amount of funds available can be limited, depending on the availability of government funds or grant from donor agencies. Direct subsidies can be used for a limited period of time to achieve a certain policy objective, for example, to increase coverage and network extension in a certain area, or to assist the utility to achieve financial viability. In any case, the intention will be to phase out the subsidy, but the danger of recurrent subsidies is that a political lobby always develops which argues for the continuation of subsidies.

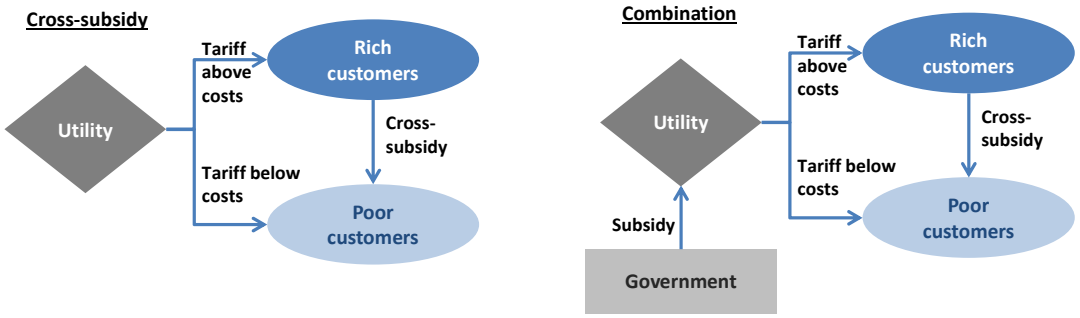
### Other customer groups – cross-subsidy

When there is no external funding from government or donor agencies, subsidies for low income or poor households can be funded by charging other customer groups tariffs which are higher than the costs of supply. Cross-subsidies can be within a customer group or between customer categories. For example, in Namibia, commercial customers pay about 20 times higher than household customers for 100 $m^3$ of water.

The tariff design requirements are that fixed and volumetric charges embedded in specific IBT structures have to generate sufficient revenue from the large customers funding the cross-subsidy to cover the requirements of the target group and any others who may benefit from the subsidy due to poor targeting. Targeting can always be improved by making the system more complex, but there is a trade-off and some degree of poor targeting will need to be tolerated.

In many cases, cross-subsidies and direct subsidies are used in conjunction with each other, as shown in Figure 7.

**Figure 7: Schematic diagram of cross-subsidies**




Source: *Water Tariffs and Subsidies in South Asia*, World Bank

The tariff levels for each customer groups should be carefully calculated for this type of cross-subsidy. It has been reported in Africa and South Asia, where cross-subsidies are used along with IBT, that if the highest level of tariff is too high, customers in that consumption group can opt out and use alternative water supplies, such as shallow wells and boreholes.

Another disadvantage of cross-subsidies is that poor households may not be connected to the network, in which case they miss out on any form of subsidy and pay higher per unit charge for alternative water supply.

Cross-subsidies can also be designed between households and shared connections, or between water supply and waste water customers. However, these cross-subsidies need to be carefully designed and monitored, as the subsidies may not reach the intended beneficiaries. For example, retail price charged at water kiosks or public taps can be higher than the meter tariff for low consumption households, defeating the purpose of providing cheap water through shared connections.

One of the major concerns with cross-subsidies between water supply and waste water customers is that not every water customers is connected to the sewerage system. More importantly, many poor households do not have a sewerage connection and therefore will miss out on the waste water subsidy. Only customers who are connected to the sewerage system will benefit and most likely they are not the ones who need the subsidy.

### 3.5.4 Effects of subsidies on incentives

Poorly designed subsidies can distort incentives and result in unsustainable conditions. For example, very low tariff levels or free water provisions may result in wastages, as customers paying low or no tariff do not have the incentives to conserve water. This will not only increase costs to the water utility, but is also detrimental to the environment, especially in areas with restricted water supply sources.

Subsidies provided directly to utilities to cover any deficits may send the wrong signals to the utilities, as it does not give them incentives to reduce costs and improve efficiency. One way to deal with this issue is to tie the subsidy to performance targets, such as improved service quality, reduction of non-revenue water, improved collection rate, etc.

***Relevance for Zimbabwe:*** In Zimbabwe's case, the main W&S subsidy in the past has been a capital subsidy, through central government meeting the main investment costs of the W&S systems. Going forward, the financing of investments in the urban W&S sector remains to be clarified as part of the new Water Policy that is currently being developed. To the extent that it is intended that future investments are to be financed through cost recovery, there has to be an element in the tariffs to cover this capital provision.

As far as recurrent cost subsidies are concerned, the main subsidy in recent years has been the provision of water treatment chemicals by UNICEF. This programme is now being phased out – a parallel study is examining the modalities and implications.

The target group for affordability-related subsidies is readily defined in Zimbabwe through geographical targeting. Income levels are much lower and house occupancy rates much higher in the high density areas (HDAs), and there is a clear imperative for cross-subsidies to be made from the LDA water consumers to the HAD consumers.

## 3.6 Wastewater tariffs

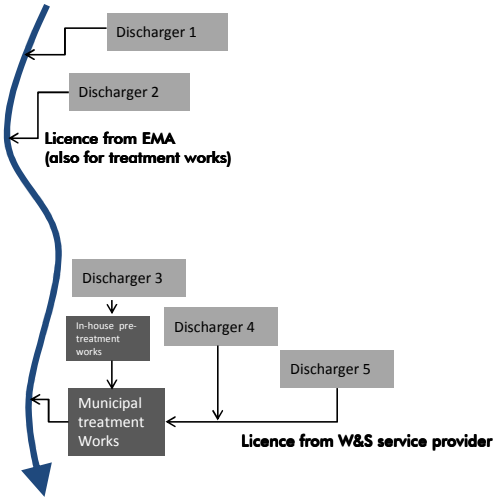
### 3.6.1 Domestic and industrial wastewater

Wastewater pricing in many countries tends to be neglected, to the detriment of cost recovery and equitable solutions to revenue raising. Zimbabwe used to be an

exception to this, with proper charges being raised to cover the cost of domestic wastewater treatment and a system in place to deal with industrial effluents.

The adopted principle for wastewater tariff is the ***polluter pay principle***, whereby charges are paid by polluters, and the amount charged should cover the cost of the pollutants to the environment, or more practically, the cost of removing or neutralising the pollutant. In practice, it is difficult to estimate the cost of the pollutant to the environment or even the cost of removing or neutralising the pollutant.

**Figure 8: Wastewater tariff and licensing**




*Source*: Adapted from various sources

There are two general types of dischargers (or polluters), dischargers who discharge wastewater straight into the water resources, or dischargers who discharge wastewater into sewerage systems, where wastewater will be treated by a service provider before discharged into water resources. These are further subdivided into those whose effluent is of standard that can be directly discharged and those who must first pre-treat to reduce the levels of undesirable substances or to reduce the strength to reduce effluent charges. Figure 8 illustrates the types of wastewater discharges

Wastewater discharged into water resources is usually regulated by environmental regulation and not included in the water supply and sanitation regulation or pricing. In general, an environmental regulator would set a quality standard for the effluents that the dischargers have to meet before discharging into the water source. The environmental regulator would monitor the quality of the effluent and fine the dischargers that do not meet this standard. A licence fee or charges, usually a volumetric charge is also payable by the discharger. This type of charging structure

will not be included in this study, as it is more relevant to environmental regulation and pricing.

### 3.6.2 Wastewater and sanitation services and tariffs

For wastewater discharged into sewerage system, in principle the dischargers pay the service provider the cost of collecting and treating the wastewater.

The difficulty in practice to achieve cost recovery for wastewater is that capital investment and O&M costs are generally higher than water supply services costs. International experience has shown that several financing mechanisms are used (often in combination) to ensure financial viability of the wastewater service provider:

- Direct beneficiary charges, which can be in the forms of:
  - Consumption based user charge (volumetric charges)
  - Service connection or availability charges (connection charges)
  - Effluent charges (for wastewater discharged into water resources)
  - Discharge permit (can be tradable)
- Indirect local taxes, which can be in the forms of:
  - Property tax
  - Local tax guarantees
  - Grant fund guarantees
- Subsidies, which can be in the forms of:
  - Direct grants
  - Subsidised loans
  - Tax allocation

Usually, volumetric charges are used for wastewater services. However, it is difficult to estimate the volume of wastewater that each customer discharges and therefore some sort of estimated discharge needs to be calculated. Typically an assumption is made about the proportion of all inbound water which will be discharged into the sewerage system (such as 85%), and the volumetric tariff is based on that assumption. For 'strong' wastewater discharged by industry, the cost of treating the wastewater is recovered by a strength charge that takes into account the mass of polluting matter (usually measured as biological or chemical oxygen demand) by charging for volume and strength of the wastewater. As discussed in connection with Figure 8, certain industries have to pretreat their wastewater before

discharge to sewer to reduce the levels of undesirable substances or to reduce the strength to reduce effluent charges.

***Relevance for Zimbabwe:*** For discharge to the environment, which includes discharge from the sewage treatment works by the local authority, Zimbabwe has had a 'traffic light' system, with different charges for discharges in green, yellow and red categories. There appears to be a perverse incentive in the current structure, in that the Environmental Management Authority (EMA) funds itself from the penalties that it levies, and thus has reason to welcome dischargers being in the red zone.

The focus in this tariff study is on discharge to the sewer by households and industrialists. The established tariffs structures for this are still appropriate. The practice in Zimbabwe in the past has been to separate water and sewerage in the tariff and billing structure, because only some customers are have both water and sewerage services - people on septic tanks are not connected to the sewers. In cities such as Harare, in industrial areas, the sewerage charge is based on volume of water consumed. There are charges based on effluent strength and volume with limits on certain parameters such as strength, settlable solids and pH. Effluent strength is measured and a charge is levied for strength above the typical strength of domestic sewage. A deduction is made for the number of toilets on the site, as this is considered to be domestic.

Ideally the trade effluent charges should reflect the cost to the city to convey and treat the effluent. If this happens then an industrialist can make an informed economic decision whether to treat the effluent himself or to pay the local authority to do it. In practice, trade effluent charges were always on the low side and there is good reason at this juncture to review this. However, this is a major exercise, involving very specific factors relating to the site, industry and treatment works concerned and is beyond the scope of the present study[4].

[4] The 2001 study by Norplan and Stewart Scott on "Impacts of Industrial Effluents on Sewers and Sewage Treatment" as part of the Bulawayo Water Conservation and Service Upgrading Project, shows what is involved in such an exercise.

# 4 Water and wastewater tariffs for the 7 Municipalities

## 4.1 Technical aspects

Water supply is constrained in the majority of the local authorities visited – only Bulawayo, Kwekwe and Mutare are more-or-less able to meet demand, and even then with constraints. In Mutare, for example, there are severe shortages in some areas due to problems in the network.

The table below shows water put into the system expressed as litres per connection per day.

**Table 6: Basic supply data for the 7 municipalities**

| Local Authority | Water put into system Ml/day | | | Number of connections | Litre per connection per day |
|---|---|---|---|---|---|
| | Gross | Less transfers to other towns | Net | | |
| Harare | 610 | 40 | 570 | 177,000 | 3,220 |
| Kwekwe | 60 | 18 | 42 | 17,513 | 2,398 |
| Mutare | 75 | Nil | 75 | 34,148 | 2,196 |
| Masvingo | 24 | Nil | 24 | 14,247 | 1,684 |
| Chegutu (after uninterruptible power supply) | 12 | Nil | 12 | 12,092 | 992 |
| Bulawayo | 135 | Nil | 135 | 160,000 | 843 |
| Chitungwiza | 32 | Nil | 32 | 67,200 | 476 |

Chegutu has until very recently been severely constrained by power supply, which limited production to about 4 Ml/day. Uninterruptible supply was provided in November and this is reflected in the table above. The figure for Harare is not reflective of availability to residents as large areas receive water intermittently or not at all.

People who get no piped water or insufficient quantities resort to other sources. In the high density areas these are boreholes with hand pumps, shallow wells and surface water. The latter two sources put the population at significant risk of water related diseases. In the low density areas, people either rely on their own boreholes or water purchased from tankers (which is often pumped from high yielding boreholes). If water supply resumes, residents of high density townships will return to municipal water rather than carry it. Residents of low density townships with their own boreholes are unlikely to return to municipal water.

All of the local authorities report high losses – both technical and commercial. There are also high proportions of non-functioning meters, both consumer meters and bulk meters. It should be noted that where the supply is intermittent it is difficult to obtain a realistic measure of water consumption. When the supply stops, some fortunate consumers' meters run backwards as air is drawn into them and when supply resumes, some unfortunate consumers' meters (not necessarily the same) clock large quantities as air is expelled through them.

Estimates of unrestricted demand are significantly higher than system capacity in Harare, Chitungwiza, Masvingo and Chegutu. Mutare has problems with distribution and control rather than supply.

In Chegutu and Chitungwiza, large housing developments are planned which will not be feasible unless there is significant expenditure on bulk water supply infrastructure.

The domestic water tariff has been capped at a maximum of $\$0.40/m^3$ by a directive from the Ministry of Local Government. There are significant differences in operating costs between local authorities, dependent on whether the supply is pumped, the distance and height that water has to be pumped and chemical usage which is dependent on the source water quality. Consequently some local authorities find it easier to work within this constraint than others.

Sewage treatment in all except Chegutu was largely in biological nutrient removal (BNR) activated sludge plants that have broken down, resulting in untreated sewage spilling to the environment. In all seven places, failures of sewer pipes and/or pump stations have resulted in significant spills to the environment. Spillage of sewage is particularly significant in Chitungwiza and Harare, whose sewage treatment plants are upstream of the main dam from which Harare Water draws for supply to Harare, Chitungwiza, Norton, Ruwa and Epworth. This pollution adds significantly to the cost of treating water.

When the sewage treatment plants are rehabilitated, power costs will increase as activated sludge plants consume a lot of power. This should not be over stated – in the case of Chitungwiza the monthly power cost for the BNR plant will be $52,000 which equates to 94 cents per stand and compares to Harare Water's charge for bulk water of $285,000 per month.

A consequence of the hyperinflation prior to 2009 and that the local authorities are carrying little in the way of debt service commitments.

## 4.2 Main water issues in the 7 Municipalities

Brief descriptions of the main water issues in each of the Municipalities are given below. More details are provided in Annex A2.

***Harare*** reported that it currently has two main problems: capacity is half of estimated unrestricted demand and the bill for their chemicals is high due to untreated sewage from Chitungwiza and Harare contaminating their water supply. On the latter point, Harare Water estimates that their monthly chemical bill could be significantly reduced if raw sewage entering the Manyame was treated properly. To avoid recording deficits in their accounts, Harare has also requested their tariffs to be increased by at least 25% across each category.

***Bulawayo*** is able to supply only about 75% of unconstrained demand. Tariffs are high for the upper bands of the rising block tariff structure. Water revenues are diverted to other uses (about half of the revenues collected in the first half of 2011, for example). The city is receiving support for water and sanitation projects from a number of donors.

***Chitungwiza*** estimate that the shortfall in supply from unrestricted demand is around 20%. The main problems are lack of supply capacity from Harare water and lack of functioning sewerage treatment works. Funds are being made available for regeneration of the pipes and clearing of blocked sewers.

***Mutare*** is fortunate to have a gravity fed water system which means pumping costs are not an issue whilst chemical costs are low due to high quality sources. It can therefore price water below the $\$0.40/m^3$ mandate. There is no ringfencing of the water budget but there is an intention to do so. Mutare reports a culture of non-payment of bills which impacts negatively on revenue collection.

***Kwekwe*** is able to fully supply demand. The biggest debtor is their bulk supply customer, ZISCO, which as of mid 2011 owed $7-$8 million or about two thirds of annual budgeted revenue. Tariffs are set through a process of consensus building. The Municipality is keen to be able to borrow to finance its capital investment programme.

***Masvingo***, by contrast, has to pump all its water from Lake Mutirikwe. Water is presently supplied in the city for only 12 hours per day, but this seems sufficient to meet a large proportion of unconstrained demand. The biggest problem is the low revenue collection rate, with government institutions owing around $2 million for water.

***Chegutu*** has been blighted by big interruptions in its power supply which have limited the amount of water which can be supplied and billed. Recently, in months when the electricity supply has been without interruptions, revenue from water sales has more than doubled - people are very willing to pay when the water flows! A new dedicated power line, funded by the PSIP, was installed in November. The Municipality plans to ring fence the water account.

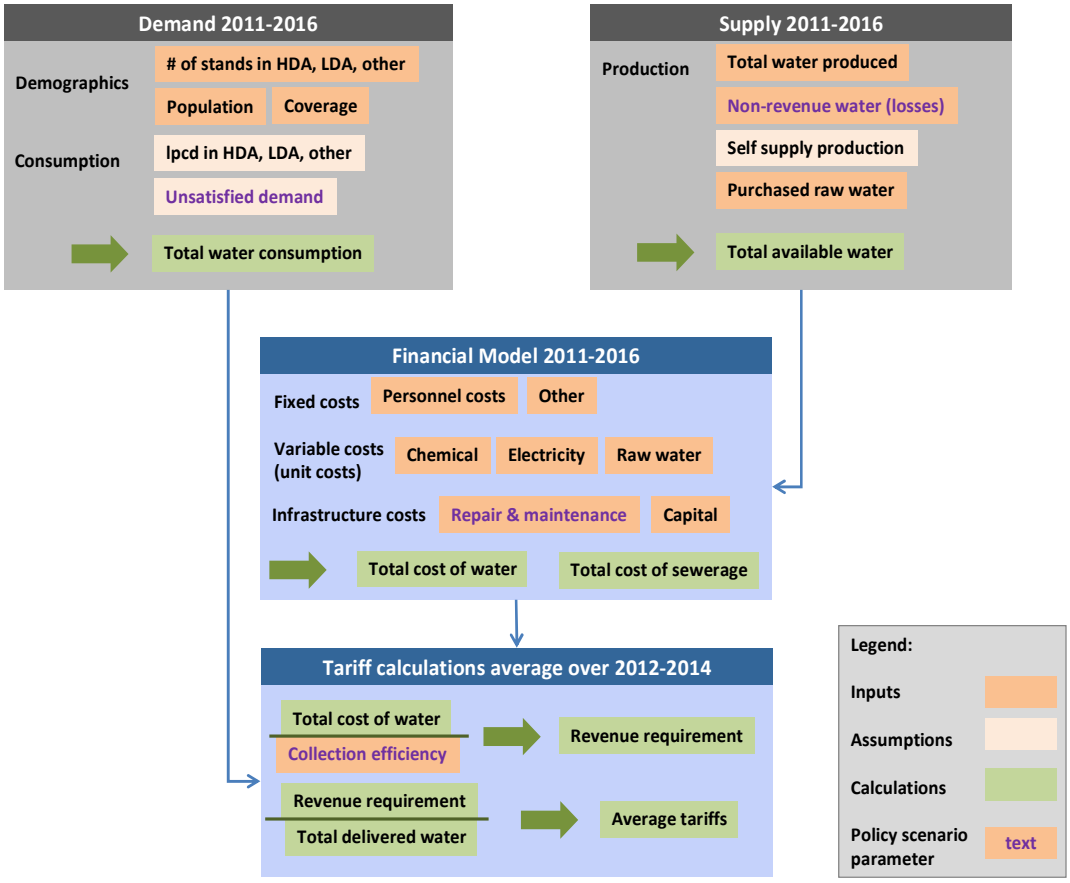
## 4.3 Tariff model and key assumptions made

Section 3.2 above presented a suitable methodology for tariff-setting in Zimbabwe. In order to operationalise this approach, spreadsheet-based tariff models have been developed for each of the seven Municipalities. Figure 9 summarises the structure of the models.

The models essentially consist of 4 main modules (the description below focuses on water, but there is a corresponding set of modules for sewerage):

- **Demand:** this module uses primary data about numbers of stands and the population and assumptions about desired consumption levels to calculate the unconstrained demand for water. It also records the current levels of consumption (including assumed consumption that is provided through self-supply via boreholes and wells).

**Figure 9: Structure of the Municipal tariff models**




- **Supply:** data inputs are existing capacity, total water produced or purchased, estimated non-revenue water (technical and non-technical losses) and assumptions about self supply. The total available water

must equal the current level of consumption – this identity allows for cross-checking and reconciliation of data and assumptions.

- **Financial model**: this part of the model tracks the costs, which are divided into 3 categories:
  - *Fixed costs* - personnel costs and other overhead costs
  - *Variable costs* - chemicals, electricity and raw water
  - *Infrastructure costs* - repair and maintenance costs and capital costs (investments)
- **Tariff calculations**: there are two stages in calculations:
  - *Revenue requirement* – this is the total cost of water divided by the collection efficiency
  - *Average tariffs* – revenue requirement divided by total delivered water

Note that the demand, supply and financial modules have data for 2010 or 2011 and projections for the five year period 2012-2016. The tariffs are calculated as the average for the three year period 2012-2014.

There are three main sets of tariffs which are calculated:

- **Current situation** – the tariffs as billed in the most recent year (average current tariff is total billed revenue divided by billed volume) and the effective tariff, which takes the collection ratio into account (actual collected revenue divided by billed volume)
- **Planned improvements** – the tariffs which should apply in order to recover costs, assuming that planned improvements in current conditions and parameters are carried out during the period being modelled. Costs, which define the required revenue, are assumed to rise over the planning horizon, so the average tariff is one which incorporates the effects of inflation (assumed levels of inflation are given below).
- **Policy scenario** – the unaltered scenario tariffs are modified by the effect on the required revenue (the numerator) and the billable water (the denominator) of 4 different elements.

Inflation assumptions, as they apply to the costs of the water and sanitation (W&S) departments, are as follows:

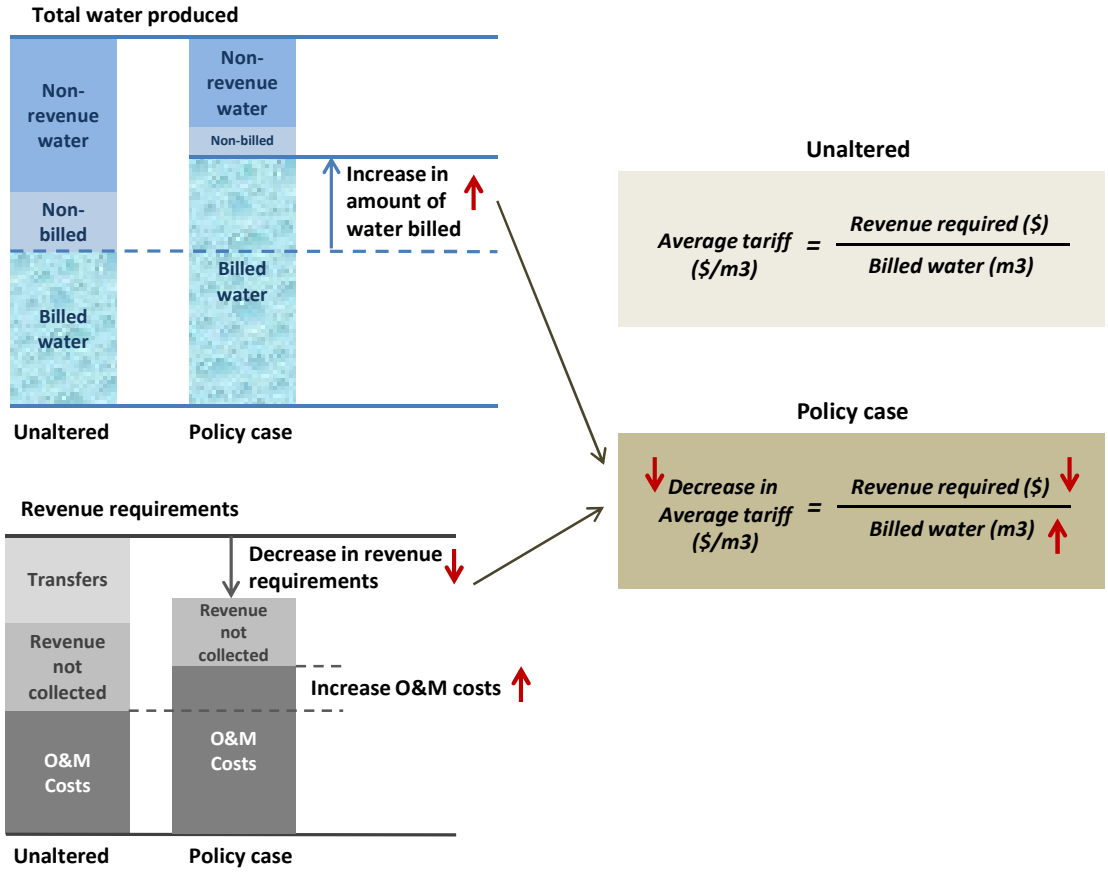
- General rate of inflation – 5% p.a.
- Electricity inflation 7%, chemicals and raw water 6% p.a.

The planned improvements are typically the installation of meters and reductions in losses. These form part of the four main factors in the policy scenario, which are:

- Increase in infrastructure spending (***repair and maintenance expenditure and capital investments which can be funded from internal resources or PSIP)*** to make up for the shortfall in maintenance in recent years and restore at least a minimum degree of integrity to the infrastructure
- Reduction in ***non-revenue water (NRW)*** through tackling both non-technical and technical losses. This is linked to the corresponding capital expenditures necessary to bring about the projected reductions in NRW
- Improvements in the ***revenue collection ratio,*** with different strategies being applied to different categories of debtors
- Reduction in the ***transfers from the W&S account to other departments*** of the municipality.

Possible mutually reinforcing interactions are illustrated in Figure 10.

**Figure 10: Illustration of the effects on the average tariff of the policy scenario**




Tariffs according to this analysis can actually go down, but in our modelling of the 7 municipalities the increases in O&M costs sufficient to ensure sustainability tend to swamp the elements which are tending to reduce the tariffs (other than in

Bulawayo). Nonetheless, even though the net result is a tariff increase, without the positive elements of the policy scenario the required tariff increases would be much larger.

The elements of the policy scenario take effect over a five year period. What are reported subsequently are the values which result at the end of the tariff calculation period, that is values for 2014.

Two levels of cost recovery are considered:

- ***O&M only***: Recovery of operation and maintenance (O&M) costs only – Government is assumed to provide grants for the capital improvements
- ***O&M and Capex***: Recovery of O&M costs and repayment of Government PSIP loans for capital improvements at 12.5% over 10 years

The levels of cost recovery could be refined, but are considered adequate for present purposes. The Municipalities presently have limited opportunities to raise finance for investments. For long-term sustainability, what is important is to put the municipalities into a position where they can raise debt finance from banks and financial markets. Potential financiers will look at:

- ***Management of the system*** – NRW, collection ratio, adequacy of repair and maintenance expenditure etc
- ***Adequacy of tariffs***, which should exceed basic O&M by a margin sufficient to allow debt service
- ***Existence of a regulatory framework*** which ensures that tariff reviews are regular and tariff awards ensure efficient, sustainable operations.

## 4.4 Results from the 7 tariff models

### 4.4.1 Caveats about data and assumptions

As compared with the situation at the Working Paper stage, the quality and consistency of the data was hugely improved through the model validation visits conducted between 14 and 21 November 2011. After discussion about the broader policy issues, working through the models typically took 3-4 hours with each Municipality. The final result of this process is a set of data and assumptions which are the Municipality's data and assumptions, not those of the consultant. Our role was to interrogate and cross-check the data, and to assist in arriving at a consistent set of assumptions. Some discrepancies and errors may nonetheless remain: we would be pleased to correct these at the final report stage.[5]

[5] The most anomalous results in what follows are for Bulawayo, which did not send their base year (2010) figures in time, and Chitungwiza, where the discussions failed to resolve some major anomalies, including the volume on which the current average tariff is to be calculated.

However, it is important to note that at this juncture not even the Municipalities can provide completely reliable data pertaining to their water and sewerage systems. This is because key parameters – including population and volumetric flows though the system – are not known with any certainty. In almost all Municipalities, the level of functioning meters is very low. Customers who receive water but don't have a functioning meter are billed on an estimated basis, but once they are on what amounts to a fixed fee basis, they tend to grossly over-use water. Hence the amount billed can bear little relation to the amount supplied and consumed. The 'upside' of this is that the installation of proper meters should result in a rapid reduction in non-technical losses, which translates into an immediate opportunity to increase supply to other customers and greatly increase revenues.

The text below discusses the results of the models in a series of comparative tables, presented in landscape format to make them more readable. It is to be noted at the outset that the results are very sensitive to certain key parameters, including the revenue collection efficiency. Drawing strong and precise conclusions about the increase or decrease in tariff is therefore to be avoided. The results instead should be regarded as indicating the direction of change that is necessary over the next few years.

### 4.4.2 Basic information about the 7 Municipalities

Table 7 presents basic demographic and water demand-supply information about the 7 Municipalities.

**Table 7: Basic information about the 7 Municipalities**

| Demand and supply | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Stands | # | 177,016 | 160,000 | 67,200 | 34,148 | 17,514 | 14,247 | 12,092 |
| Population | # | 2,504,088 | 985,000 | 1,000,000 | 300,000 | 155,000 | 120,000 | 107,007 |
| of which HDA | # | 2,219,283 | 756,760 | 1,000,000 | 281,143 | 142,900 | 115,236 | 90,500 |
| prop. of total | % | 89% | 77% | 100% | 94% | 92% | 96% | 85% |
| Unconstrained demand | Ml/d | 1,200 | 221 | 136 | 45 | 54 | 50 | 21 |
| Connections | # | 177,016 | 160,000 | 67,200 | 34,148 | 17,514 | 14,247 | 12,092 |
| Staff | # | 2,480 | 530 | 365 | 155 | 112 | 77 | 42 |
| WTW capacity | Ml/d | 704 | 260 | 0 | 64 | 90 | 30 | 12 |
| Current production | Ml/d | 570 | 140 | 30 | 70 | 60 | 24 | 8 |
| Losses | Ml/d | 325 | 49 | 9 | 36 | 24 | 10 | 3 |
| Prop. production | % | 57% | 35% | 30% | 52% | 40% | 41% | 40% |
| Opportunity cost of losses | $m pa | 35.3 | 2.8 | 0.3 | 0.6 | 0.8 | 0.6 | 0.1 |
| Net current piped supply | Ml/d | 244 | 91 | 21 | 34 | 36 | 14 | 5 |
| Prop. unconstrained demand | % | 20% | 41% | 15% | 75% | 66% | 28% | 22% |
| Self supply | Ml/d | 53 | 11 | 12 | 2 | 0 | 0 | 3 |
| Prop. unconstrained demand | % | 4% | 5% | 9% | 5% | 0% | 0% | 12% |
| Total consumption | Ml/d | 298 | 102 | 33 | 36 | 36 | 14 | 7 |
| Prop. unconstrained demand | % | 25% | 46% | 24% | 80% | 66% | 29% | 34% |
| STW operational capacity | Ml/d | 220 | 89 | 56 | 34 | 35 | 23 | 12 |
| Current volumes treated | Ml/d | 275 | 91 | 29 | 43 | 23 | 14 | 7 |
| Capacity utilisation | % | 125% | 103% | 52% | 128% | 66% | 60% | 59% |

The first panel of the table has demographic information. As already noted, the population information is particularly uncertain. It is important to forge agreement on the assumptions to be used because these drive important parameters in the model, notably the level of unconstrained demand. The 2012 Census will enable the Municipalities to obtain accurate figures for population, but the census information will probably not be available until 2013. The assumptions used for calculating water tariffs should certainly be reviewed at that time.

The next panel records the number of connections, the number of staff, current water treatment works (WTW) capacity and current production. Only in Mutare is WTW capacity fully utilised at present (in fact over-utilised, 70 ML/d being produced from a plant with nameplate capacity of 64 Ml/d). The amount of water that Chitungwiza purchases from Harare is uncertain because it is not metered. The city is charged for 27 Ml/d, but the indications are that the volume is larger. We have used 30 Ml/d in the model.

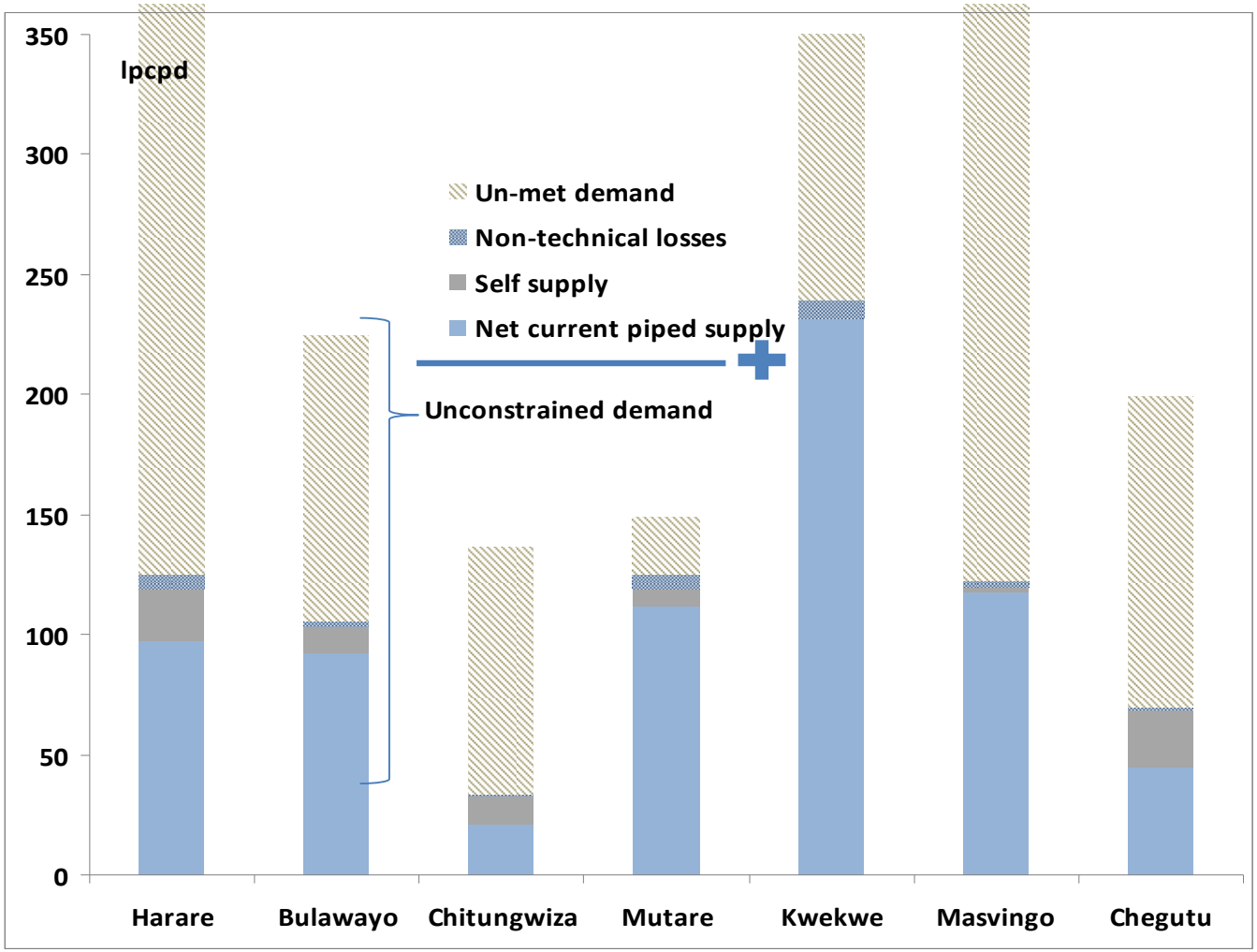
Losses are high in all Municipalities, ranging from 30% in Chitungwiza to 57% in Harare, but there seems considerably uncertainty about the accuracy of the figures given. The model allows some cross checking of the level of losses which the Municipalities have been assuming. The cost of losses reported in Table 7 represents the revenue lost when supplying treated water that never gets sold, compared to benchmark losses of 20% - the figure for Harare is $35 million per year. The costs are incurred whether the water is sold or not – the opportunity cost that is involved in NRW is the effective tariff, which takes the collection ratio into account (actual collected revenue divided by billed volume), multiplied by the excess losses (difference between actual losses and the benchmark level of 20%).

The next panel deals with present levels of supply of piped water and of consumption of water (piped plus self-supply water). It is only Mutare and Kwekwe which supply between two thirds and three quarters of unconstrained demand with piped water. The lowest performer is Chitungwiza, which only supplies 15% of unconstrained demand, which is itself based on a lower assumed consumption per capita than other Municipalities.

Self-supply is thought to be important in Harare, Bulawayo, Chitungwiza and Chegutu, with the actual values on a Ml/d basis being as shown in the table. The relative contribution of self supply is highest in Chitungwiza (9%) and Chegutu (12%).

Total consumption of water is closest to unconstrained demand in Mutare (80%) and Kwekwe (66%). The unconstrained figure for Harare is high because it includes provision for bulk sales to Norton and Chitungwiza as well as large industrial demand. The extent to which unconstrained demand is presently met by water supplied via piped water (after losses), self supply water and by so-called 'non-technical losses' (ie consumption of treated water that people do not pay for) is illustrated in Figure 11.

**Figure 11: Present consumption of water and unconstrained demand**



The final panel of Table 7 gives data on sewerage treatment work (STW) capacity. At present, except for Bulawayo and part of Harare's capacity, STWs are not in operation and the volume figures are for the amounts of sewage transported rather than treated. During the period covered by the model, various STWs are expected to resume operations – the step-increases in costs (especially electricity cost) that this will involve are captured in the model.

### 4.4.3 Per capita consumption data

Table 8 gives data on per capita consumption of water in the 7 Municipalities. The 'target gross' figures are unconstrained demand divided by population for each Municipality. These per capita figures are 'gross' in that they include water that is used by industry and commerce.

**Table 8: Per capita consumption of water**

| Per capita data | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Target gross per capita | lpcpd | 479 | 225 | 136 | 149 | 350 | 417 | 200 |
| Gross per capita consumption | lpcpd | 98 | 92 | 21 | 112 | 232 | 118 | 45 |
| Household level HDA | lpcpd | 38 | 51 | 5 | 96 | 85 | 97 | 19 |
| Household level LDA | lpcpd | 120 | 149 | 0 | 244 | 200 | 327 | 102 |
| Policy scenario gross per capita | lpcpd | 204 | 100 | 22 | 162 | 286 | 185 | 91 |
| Policy scenario HDA | lpcpd | 85 | 57 | 7 | 127 | 103 | 134 | 49 |
| Policy scenario LDA | lpcpd | 160 | 166 | 0 | 349 | 200 | 446 | 195 |

The 'household level' figures provide information on the amount of water that is actually used by each person at the household level. The LDA figures are higher than the HDA per capita figures because of higher levels of income allowing higher consumption of water, and different patterns of use, particularly large water-hungry gardens.

There are significant differences in the household level data on current water consumption, with the HDA per capita figures varying from an implausibly low figure of 5 lpcpd in Chitungwiza to 97 lpcpd in Masvingo. The corresponding range for LDA per capita household consumption varies from 102 lpcpd in Chegutu to 327 lpcpd in Masvingo.

The policy scenario, which includes reduction in NRW and hence more piped water being available to meet demand, results in higher levels of gross per capita consumption, particularly in Harare and Chegutu (more than 100% increase).

### 4.4.4 Current financial situation

Table 9 provides a summary of key financial data for both water and sewerage. The first panel is the revenue billed and the revenue collected. The net cash flow before transfers to other department of the municipality is the collected W&S revenue minus W&S costs. This figure is negative for Harare, Chitungwiza and Chegutu. The other municipalities currently collect sufficient revenue to cover their O&M costs.

The next panel gives the current average tariffs – first the tariff as billed and then the effective tariff actually collected. Both these ratios are calculated with the billed volume in the denominator. Tariffs as billed vary from \$0.23 per $m^3$ in Mutare to \$0.82 per $m^3$ in Harare. The effective tariffs are much lower, however, varying from \$0.07 per $m^3$ in Mutare to \$0.46 per $m^3$ in Harare.

The next row gives the component of the water tariff which is transferred to other departments of the Municipality. The highest level of transfer is recorded as being in Masvingo (\$0.08 per $m^3$).

The final panel gives the comparative costs per $m^3$, broken down into fixed and variable. The highest cost is Harare (\$0.50 per $m^3$), followed by Harare's largest bulk customer, Chitungwiza (\$0.48 per $m^3$), with the lowest being Mutare (\$0.05 per $m^3$) and Kwekwe (\$0.11 per $m^3$). Figure 12 presents a bar chart illustration of the differences in cost per m3 in the 7 Municipalities. The line graph is the average effective tariff (the amount of revenue actually collected per billed cubic metre of water).

The bottom half of Table 9 gives information on the sewerage account. This shows that the costs vary from \$0.05 to \$0.24 per $m^3$ at present, but these are low because most STWs are not in operation. Future unit costs of properly treated sewage will be much higher (O&M policy scenario costs vary between \$0.12 and \$0.58 per $m^3$ – see Table 12 below).

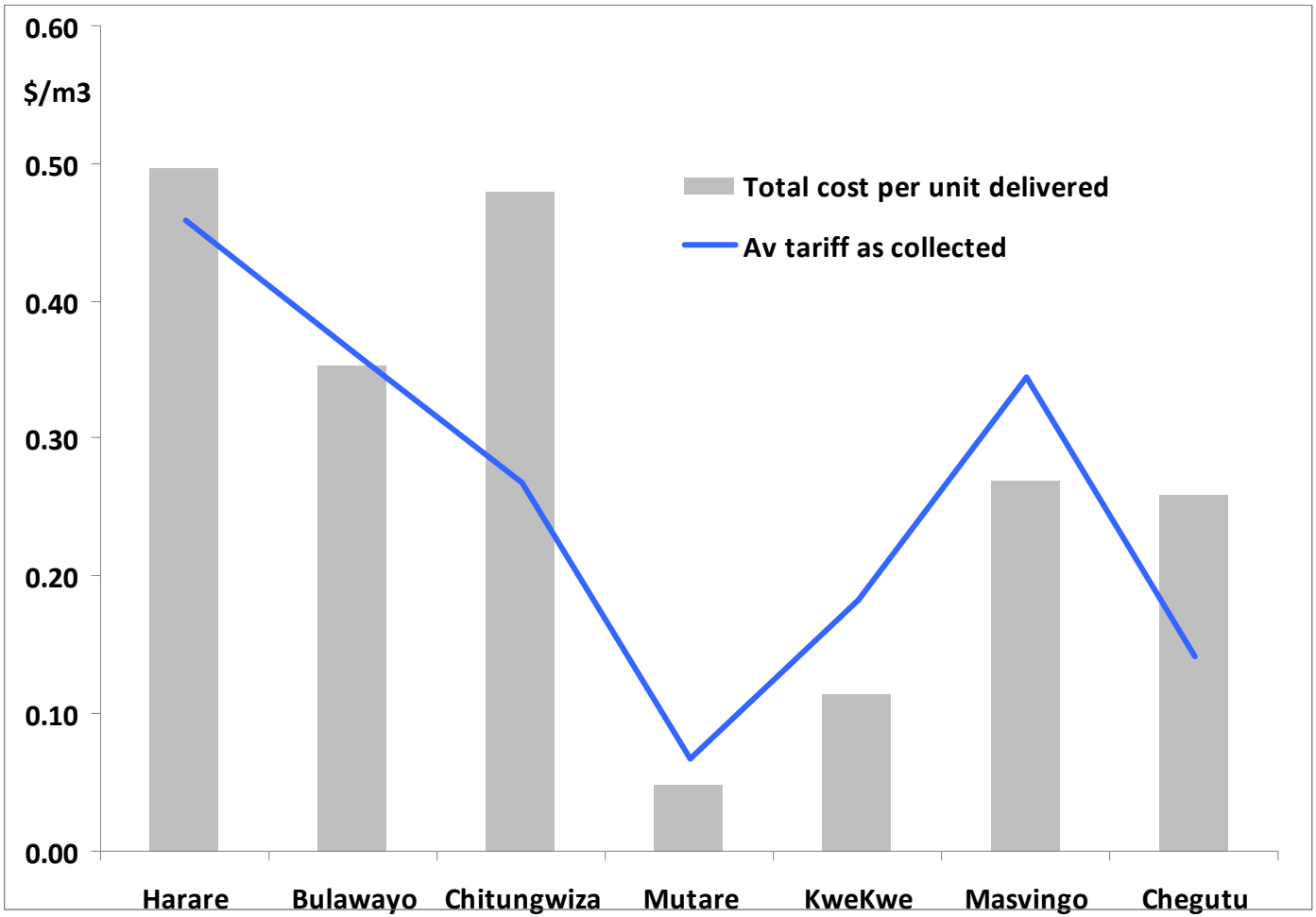
The final row to comment on is the 'overall efficiency'. This is the ratio of volume of water on which revenue is actually collected divided by the volume of water supplied (with corresponding definition for sewerage). It combines the effect of the amount of water that is lost between supply and billed amount and the presently small proportion of the billed revenue which is actually collected. The regional benchmark for overall efficiency is 66%: the best performer at present is Bulawayo at 39%, the worst is Mutare at 15%.

**Table 9: Financial situation**

| Current financial data - water | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Revenue billed | $m p.a. | 73.0 | 20.0 | 5.8 | 2.9 | 6.0 | 3.0 | 0.5 |
| Revenue collected | $m p.a. | 40.9 | 12.0 | 2.0 | 0.9 | 2.4 | 1.8 | 0.3 |
| Collection efficiency | % | 56% | 60% | 35% | 30% | 40% | 60% | 55% |
| Overall efficiency | % | 24% | 39% | 25% | 15% | 24% | 35% | 34% |
| Net cash flow (before transfers) | $m p.a. | -3.40 | 0.32 | -1.62 | 0.27 | 0.90 | 0.39 | -0.20 |
| Volume billed | M m3 p.a. | 89.2 | 33.1 | 7.6 | 12.7 | 13.1 | 5.2 | 1.8 |
| Av tariff as billed | $/m3 | 0.82 | 0.60 | 0.76 | 0.23 | 0.46 | 0.58 | 0.26 |
| Av tariff as collected | $/m3 | 0.46 | 0.36 | 0.27 | 0.07 | 0.18 | 0.35 | 0.14 |
| Transfers component of tariff | $/m3 | 0.00 | 0.01 | 0.00 | 0.02 | 0.07 | 0.08 | 0.00 |
| Fixed costs per unit delivered | $/m3 | 0.23 | 0.19 | 0.03 | 0.03 | 0.04 | 0.08 | 0.12 |
| Variable cost per unit delivered | $/m3 | 0.27 | 0.16 | 0.45 | 0.02 | 0.07 | 0.19 | 0.14 |
| Total cost per unit delivered | $/m3 | 0.50 | 0.35 | 0.48 | 0.05 | 0.11 | 0.27 | 0.26 |

| Current financial data - sewerage | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Revenue billed | $m p.a. | 23.0 | 5.8 | 2.8 | 1.8 | 0.7 | 0.7 | 0.2 |
| Revenue collected | $m p.a. | 12.9 | 3.5 | 1.0 | 0.5 | 0.3 | 0.4 | 0.1 |
| Collection efficiency | % | 56% | 60% | 35% | 30% | 40% | 60% | 55% |
| Overall efficiency | % | 24% | 39% | 25% | 15% | 24% | 35% | 34% |
| Net cash flow (before transfers) | $m p.a. | -10.8 | -1.1 | -0.4 | -0.3 | 0.0 | -0.4 | -0.1 |
| Volume billed | M m3 p.a. | 12.9 | 3.5 | 1.0 | 0.5 | 0.3 | 0.4 | 0.1 |
| Av tariff as billed | $/m3 | 0.23 | 0.17 | 0.27 | 0.11 | 0.08 | 0.15 | 0.07 |
| Av tariff as collected | $/m3 | 0.13 | 0.10 | 0.09 | 0.03 | 0.03 | 0.09 | 0.04 |
| Transfers component of tariff | $/m3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fixed costs per unit treated | $/m3 | 0.19 | 0.13 | 0.13 | 0.05 | 0.03 | 0.10 | 0.06 |
| Variable cost per unit treated | $/m3 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| Total cost per unit treated | $/m3 | 0.24 | 0.14 | 0.13 | 0.05 | 0.04 | 0.17 | 0.06 |

**Figure 12: Total water cost per m³ and effective tariff**



### 4.4.5 Unit cost comparisons

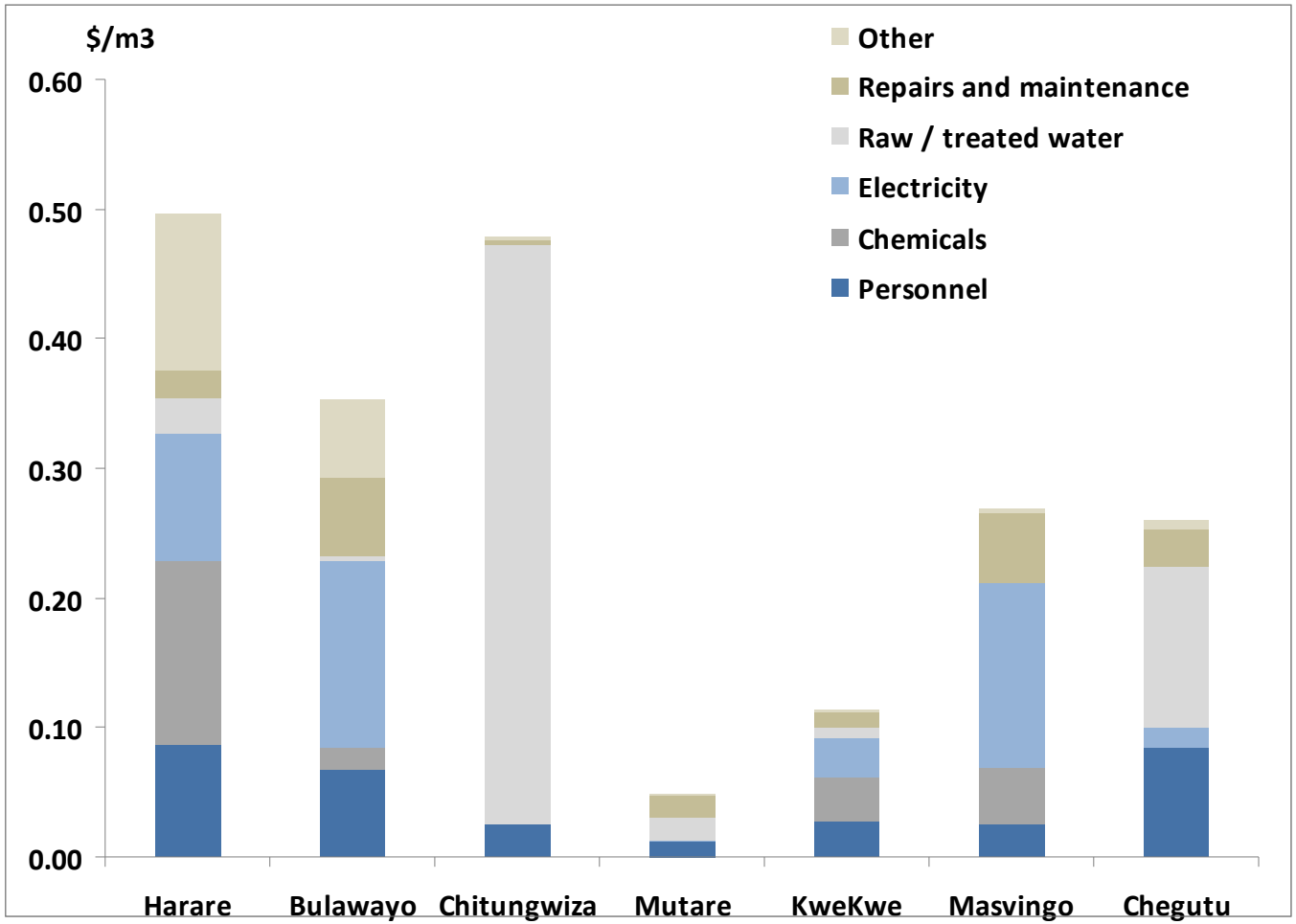
Table 10 gives a breakdown of the unit costs in each Municipality. The breakdown of costs for water is illustrated graphically in Figure 13. Harare Water has the highest costs due to personnel, chemical and other costs being high relative to other municipalities. The highest electricity costs per unit are in Bulawayo and Masvingo, followed by Harare.

**Table 10: Unit cost comparisons for water and sewerage ($/m³)**

| Unit cost comparisons - water | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Personnel | $/m3 | 0.09 | 0.07 | 0.03 | 0.01 | 0.03 | 0.02 | 0.08 |
| Chemicals | $/m3 | 0.14 | 0.02 | 0.00 | 0.00 | 0.03 | 0.04 | 0.00 |
| Electricity | $/m3 | 0.10 | 0.14 | 0.00 | 0.00 | 0.03 | 0.14 | 0.02 |
| Raw / treated water | $/m3 | 0.03 | 0.00 | 0.45 | 0.02 | 0.01 | 0.00 | 0.12 |
| Repairs and maintenance | $/m3 | 0.02 | 0.06 | 0.00 | 0.02 | 0.01 | 0.05 | 0.03 |
| Other | $/m3 | 0.12 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Total cost per unit | $/m3 | 0.50 | 0.35 | 0.48 | 0.05 | 0.11 | 0.27 | 0.26 |

| Unit cost comparisons - sewerage | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Personnel | $/m3 | 0.06 | 0.03 | 0.03 | 0.02 | 0.03 | 0.05 | 0.05 |
| Chemicals | $/m3 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electricity | $/m3 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| Repairs and maintenance | $/m3 | 0.06 | 0.02 | 0.08 | 0.02 | 0.00 | 0.04 | 0.00 |
| Other | $/m3 | 0.07 | 0.08 | 0.02 | 0.01 | 0.00 | 0.01 | 0.01 |
| Total cost per unit | $/m3 | 0.24 | 0.14 | 0.13 | 0.05 | 0.04 | 0.17 | 0.06 |

**Figure 13: Breakdown of water unit cost comparison ($/m³)**



### 4.4.6 Tariff results

Table 11 gives the main results for this study on water and sewerage tariffs. As already mentioned, the average water tariff as billed currently ranges from $0.23 per m3 in Mutare to $0.82 per m3 in Harare. The effective tariff, which is based on the revenue actually collected, is much lower, ranging from $0.07 per $m^3$ in Mutare to $0.46 per $m^3$ in Harare.

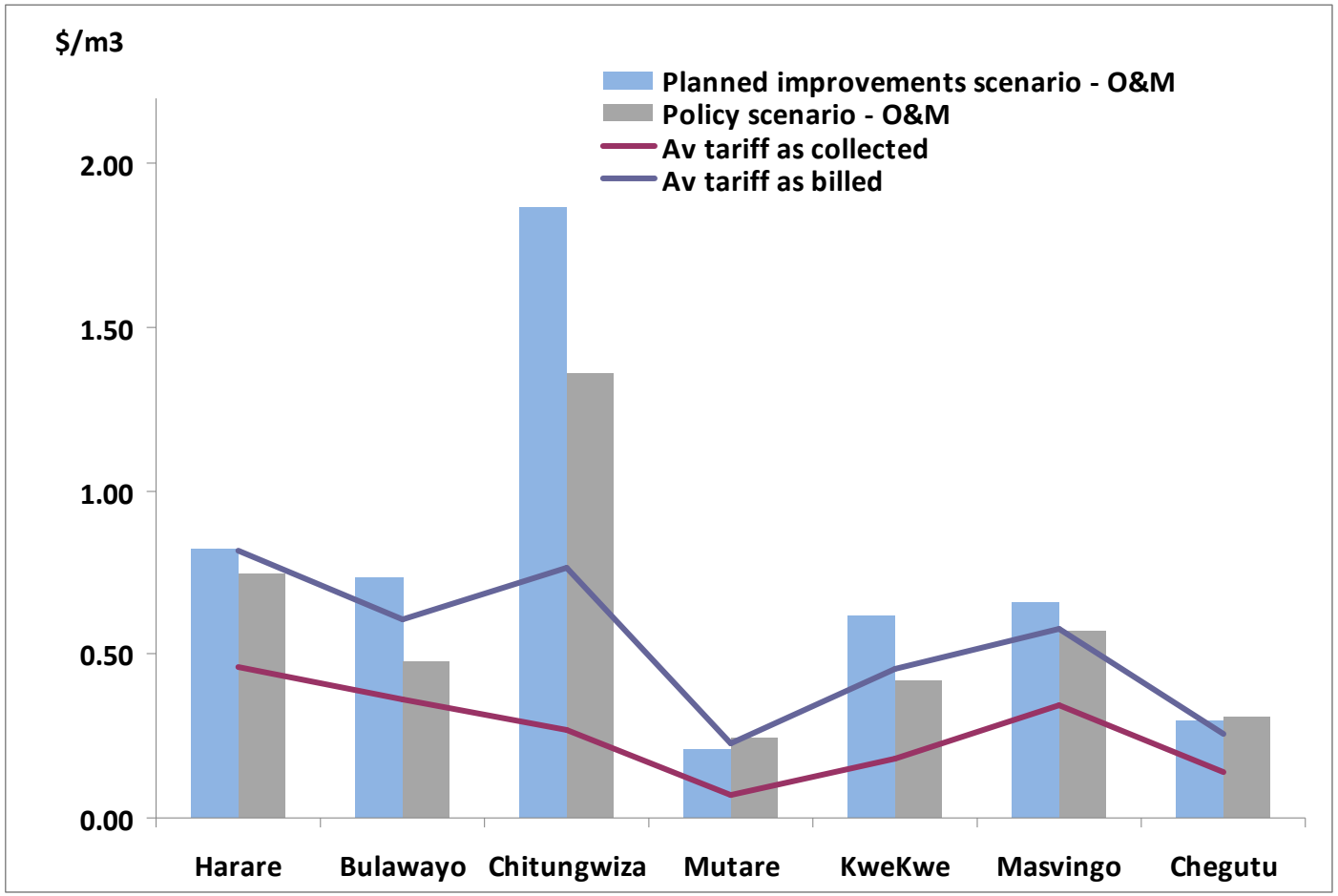
The ***planned improvements tariffs*** are higher than the current tariffs because of the costs of the improvements and the need to allow for inflation. The ***policy scenario tariffs*** sufficient to cover O&M costs also include inflation, but are lower than the planned improvements tariffs for all the Municipalities except Mutare and Chegutu, because of reduced revenue requirements and increased billable volumes. The *O&M policy scenario* tariffs range from $0.24 per $m^3$ for Mutare to $1.36 per $m^3$ for Chitungwiza. The unaltered and policy scenario tariffs are shown as bars in Figure 14, and can readily be compared with the existing billed and effective tariffs (shown as lines).

**Table 11: Water and sewerage tariffs – existing, planned improvements and policy scenarios**

| Water tariffs - allowing for inflation | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Av tariff as billed | $/m3 | 0.82 | 0.60 | 0.76 | 0.23 | 0.46 | 0.58 | 0.26 |
| Av tariff as collected | $/m3 | 0.46 | 0.36 | 0.27 | 0.07 | 0.18 | 0.35 | 0.14 |
| Planned improvements sc - O&M | $/m3 | 0.82 | 0.74 | 1.87 | 0.21 | 0.62 | 0.66 | 0.30 |
| Policy scenario - O&M | $/m3 | 0.75 | 0.48 | 1.36 | 0.24 | 0.42 | 0.57 | 0.31 |
| Planned improvements sc - O&M + Capex | $/m3 | 0.93 | 0.75 | 2.02 | 0.48 | 0.62 | 0.78 | 0.34 |
| Policy scenario - O&M & capex | $/m3 | 0.75 | 0.48 | 1.47 | 0.39 | 0.43 | 0.66 | 0.33 |

| Sewerage tariffs - allowing for inflation | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Av tariff as billed | $/m3 | 0.23 | 0.17 | 0.27 | 0.11 | 0.08 | 0.15 | 0.07 |
| Av tariff as collected | $/m3 | 0.13 | 0.10 | 0.09 | 0.03 | 0.03 | 0.09 | 0.04 |
| Planned improvements sc - O&M | $/m3 | 0.47 | 0.33 | 0.64 | 0.37 | 0.54 | 0.39 | 0.10 |
| Policy scenario - O&M | $/m3 | 0.58 | 0.32 | 0.43 | 0.18 | 0.12 | 0.27 | 0.12 |
| Planned improvements sc - O&M + Capex | $/m3 | 0.47 | 0.36 | 0.67 | 0.46 | 0.66 | 0.42 | 0.14 |
| Policy scenario - O&M & capex | $/m3 | 0.58 | 0.36 | 0.48 | 0.27 | 0.27 | 0.32 | 0.17 |

**Figure 14: Policy tariffs for water compared with unaltered scenario and existing tariffs**



Tariffs for sewerage in Table 11 increase sharply for the *planned improvements scenario* because this includes the costs of treatment when the STWs are put back into operation. The *policy case* tariffs are lower than the *planned improvements scenario*, except for Harare, where a much higher level of infrastructure expenditure is being planned to ensure sustainability of sewage treatment services.

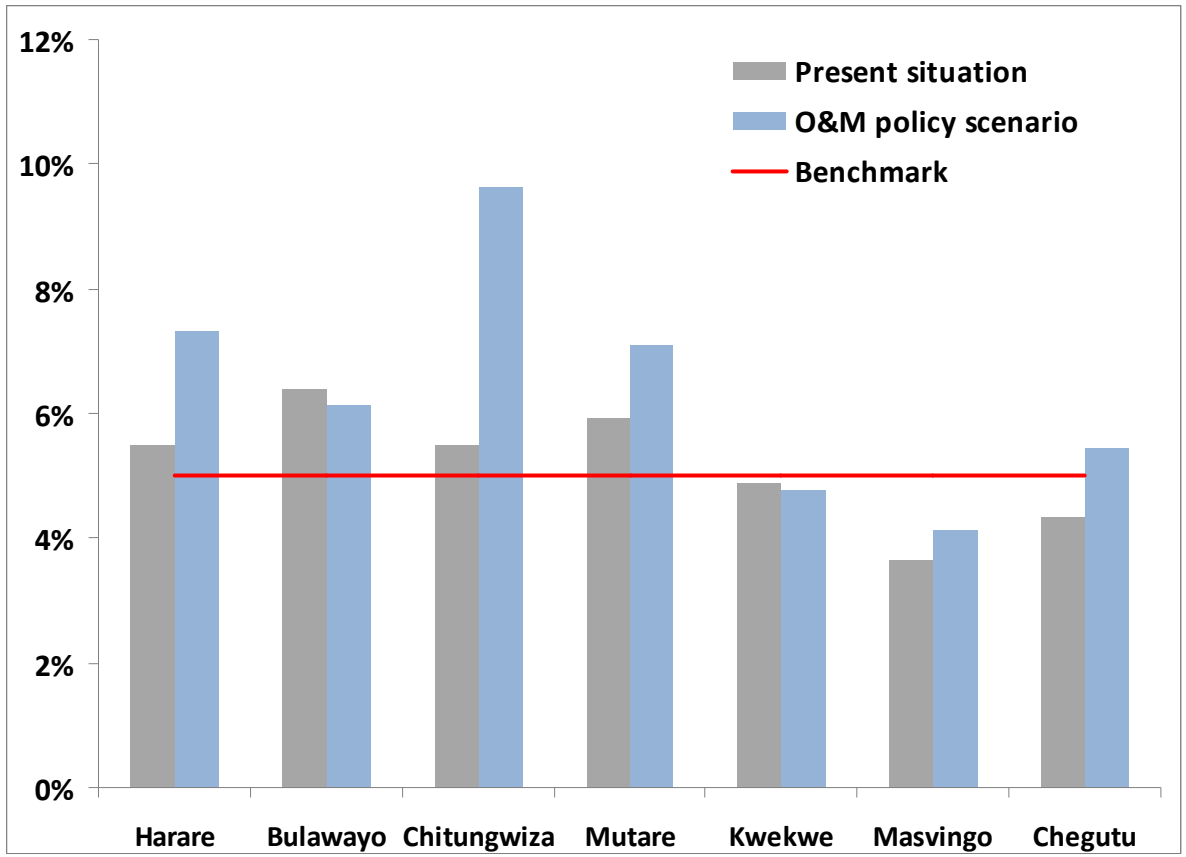
Table 12 summarises the changes in tariffs which would arise if the *O&M policy scenario* tariffs were to be adopted. The final panel shows the combined effect on average tariffs for a customer that pays for both water and sewerage, assuming the sewerage charge is based on 70% of the water supplied being returned to the STW. This shows that while required water tariff changes are generally modest (outliers being Bulawayo at minus 21%, Chitungwiza at plus 78% and Chegutu at plus 19%), in the case of sewerage, present tariffs are clearly far too low and will need to be significantly raised (by between 43% in Kwekwe and 152% in Harare).

Combining these figures, the net impact on the combined tariff would be close to zero in Bulawayo and Kwekwe, but significant in other municipalities (increases from 13% in Masvingo to 75% in Chitungwiza). The immediate implementation of these increases would result in exacerbated affordability problems in Harare, Chitungwiza, Mutare and Chegutu – see Figure 15 which is based on Table 4 in Section 2.6.

**Table 12: Tariff changes needed if the O&M policy scenario were to be adopted**

| Calculated tariffs | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|
| Av water tariff as billed | $/m3 | 0.82 | 0.60 | 0.76 | 0.23 | 0.46 | 0.58 | 0.26 |
| Policy scenario - O&M - water | $/m3 | 0.75 | 0.48 | 1.36 | 0.24 | 0.42 | 0.57 | 0.31 |
| Increase in water tariff | % | -8% | -21% | 78% | 7% | -8% | 0% | 19% |
| Av sewerage tariff as billed | $/m3 | 0.23 | 0.17 | 0.27 | 0.11 | 0.08 | 0.15 | 0.07 |
| Policy scenario - O&M - sewerage | $/m3 | 0.58 | 0.32 | 0.43 | 0.18 | 0.12 | 0.27 | 0.12 |
| Increase in sewerage tariff | % | 152% | 80% | 61% | 57% | 43% | 89% | 58% |
| Av combined tariff as billed | $/m3 | 0.98 | 0.73 | 0.95 | 0.31 | 0.51 | 0.68 | 0.31 |
| Policy scenario - O&M - 70% return | $/m3 | 1.15 | 0.70 | 1.66 | 0.37 | 0.50 | 0.77 | 0.39 |
| Increase in combined tariff | % | 18% | -4% | 75% | 20% | -2% | 13% | 26% |

**Figure 15: Current and 'policy case' affordability**



### 4.4.7 Regional benchmark comparators

The final table in this section gives some regional benchmarks. These are drawn from the benchmarking reports of the Kenyan and Zambian regulators, WASREB and NWASCO (see Section 5.5 below).

**Table 13: Zimbabwean utility performance relative to regional water benchmarks**

| Regional benchmark comparators (acceptable range) | | Units | Harare | Bulawayo | Chitungwiza | Mutare | KweKwe | Masvingo | Chegutu |
|---|---|---|---|---|---|---|---|---|---|
| Non-revenue water | Regional benchmark | % | 20-25% | 20-25% | 20-25% | 20-25% | 20-25% | 20-25% | 20-25% |
| | Unaltered scenario | % | 57% | 35% | 30% | 52% | 40% | 41% | 40% |
| | Policy scenario (in 2014) | % | 30% | 25% | 20% | 31% | 20% | 20% | 20% |
| Collection efficiency | Regional benchmark | % | 85-90% | 85-90% | 85-90% | 85-90% | 85-90% | 85-90% | 85-90% |
| | Unaltered scenario | % | 56% | 60% | 35% | 30% | 40% | 60% | 55% |
| | Policy scenario (in 2014) | % | 84% | 81% | 56% | 57% | 61% | 81% | 76% |
| Repairs and Maintenance | Regional benchmark | % | 10%-30% | 10%-30% | 10%-30% | 10%-30% | 10%-30% | 10%-30% | 10%-30% |
| as proportion of total O&M | Unaltered scenario | % | 11% | 17% | 17% | 36% | 9% | 21% | 10% |
| | Policy scenario (in 2014) | % | 12% | 26% | 14% | 37% | 2% | 20% | 18% |
| O&M cost coverage | Regional benchmark | % | 100-150% | 100-150% | 100-150% | 100-150% | 100-150% | 100-150% | 100-150% |
| by collected revenue | Unaltered scenario | % | 79% | 95% | 60% | 99% | 147% | 98% | 58% |
| | Policy scenario (in 2014) | % | 132% | 128% | 129% | 151% | 164% | 139% | 123% |
| Staff per 1,000 connections | Regional benchmark | # | 5-8 | 5-8 | 5-8 | 5-8 | 5-8 | 5-8 | 5-8 |
| | Current level (water) | # | 14.01 | 3.31 | 5.43 | 4.54 | 6.39 | 5.40 | 3.47 |

***Regional benchmarks:*** WASREB and NWASCO

***Note:*** Not included water quality and customer service standard indicators. Also sewerage not included in above.

***Repairs and maintenance benchmark*** is calculated from data from well run Kenyan and Zambian utilities over last 5 years

Five indicators are captured in Table 13. The first three are key components of the policy scenario, the fourth policy element being transfers of W&S revenues to other departments in the Municipalities – something that is completely unheard of in other countries!

- ***Non-revenue water*** – the regional benchmark is 20-25%. The Zimbabwe W&S departments have 30-60% NRW at present. The policy scenario assumes that this can be reduced to 20% to 30%. The feasibility of very rapid declines in NRW will depend on how much of the balance between non-technical losses (which can be quickly changed) and technical losses (which typically take much longer to address).

- ***Collection efficiency –*** the regional benchmark is 85-90%. At present, the collection efficiency in Zimbabwe is between 30% and 60%. In the policy scenario, collection efficiency is projected to improve to between 56% and 84%.

- ***Infrastructure expenditure as a proportion of total O&M:*** for satisfactory and sustainable service delivery, this is a crucial benchmark, but is not one that WASREB or NWASCO have established. To obtain a benchmark level, we have therefore analysed the information to hand from well managed utilities, and this has shown that the proportions vary considerably. This is understandable: fully functional utilities can get away with a 10% proportion, but utilities which have fallen behind in repairs and maintenance (R&M) have to spend a much higher proportion on repairs and maintenance. It is clearly the upper end of the benchmark (30%) which is relevant for Zimbabwe at the present time. On this measure, the W&S departments with reasonable levels of repair and maintenance are Mutare and Masvingo. In the policy case, there will be much higher levels of expenditure for upcoming years in Bulawayo and Chegutu.

- ***O&M cost coverage by collected revenue*** – the regional benchmark is 100-150%. Only Kwekwe is presently in that range, but all of the Zimbabwe W&S departments would perform well on this measure in the policy scenario.

- ***Staff per 1,000 connections*** – the regional benchmark, which we understand is for combined water and sewerage companies, is 5-8 for large utilities and 7-11 for smaller utilities (this difference reflects the economies of scale which exist in the W&S sector). Zimbabwe's W&S departments perform well relative to these benchmarks, except for Harare which would appear to be significantly over-staffed. This is one of the important reasons for Harare Water's high cost structure.

# 5 Institutional frameworks for review and approval of tariffs

## 5.1 Justification for regulation of network industries

The intrinsic natural monopoly characteristic of network industries justifies the regulation of these industries. Natural monopolies arise in water supply because the high capital requirements of constructing a network create major barriers to entry. The incumbent owner can provide water under conditions of economies of scale and scope, which translates into lower costs than the costs of multiple, smaller firms should such firms attempt to provide services to customers in the same geographical area. Beyond these rather technical economic considerations, regulation is further justified by the fact that the water sector is economically vital and socially sensitive.

Economic regulation in the water sector is crucial when there is private ownership of the water supply companies, as is the case in England and Wales, for example. The water regulator, OFWAT, was therefore established at the time that the water companies were privatised in the UK. Under private ownership, the main focus is to prevent the water companies from exploiting their natural monopolies by charging excessively high prices for what is an essential service to people living in the areas which they have been licensed to supply. The main responsibility of the regulator is to the customers – they should enjoy reliable, high quality services at the lowest possible price.

In countries where there is still public ownership of the water supply industry, formal economic regulation has nonetheless still been found to offer many benefits. In most cases, publicly own water utility charges tariffs which are below the cost of supply, which often resulted in poor service, asset deterioration and the inability to invest to meet growing demand. In this case, economic regulation will serve the purpose of balancing the needs of customers and of the supplier by ensuring that good quality service is provided at a reasonable tariff.

Tariff applications have to be submitted to the regulator, who has the experience and expertise to understand what is at stake and grant tariff increases which are often linked to the attainment of key performance indicators, or to incentive based performance contracts with the managers of the public companies. The regulator will also ensure that the need for low income households to have access to water at an affordable cost is catered for, without undermining the long-term viability of the supplier as all customers ultimately rely on sustainability of the supply industry. In essence, the regulator of publicly owned water sectors strives to deliver for the customers an outcome that is comparable in efficiency terms with private, competitive industries and also incorporates national social objectives.

***Relevance for Zimbabwe***: Particularly during the hyperinflationary epoch, water tariffs were well below cost recovery levels, and this resulted in poor service and asset deterioration. Tariff increases on their own may not be sufficient to restore the

viability of the W&S supply systems. Regulation is needed to align tariff levels with service quality and standards, and to do so in a sustainable manner going forward. Ensuring that customers understand the strategy being adopted and have an opportunity to make their representations on any proposed tariff changes are also central elements of the modern regulatory approach. The Municipalities interviewed are committed to serving and working closely with their customers and do not want this to be diluted in any way by the possible establishment of a national regulator.

## 5.2 Regulatory characteristics and functions

Modern, professional regulatory agencies are established to ensure high quality service is delivered at progressively lower costs to consumers. This is to be achieved by striking a fair balance between the interests of consumers and providers, and doing so in a way which is free of day-to-day political interference.

Professional, independent regulators expose public service providers to demanding regulatory standards and disciplines, while assuring private providers of adequate financial returns for efficient performance. A well regulated network industry reduces many of the investment risks and thus lowers the costs of private equity and debt financing.

As will be discussed in more detail later, there are many institutional forms which a regulator can take. It is useful to precede a discussion of what form is best suited to Zimbabwe's water sector by identifying the functions which water and wastewater regulators are typically empowered to perform, such as:

- ❑ Licensing
- ❑ Tariff setting
- ❑ Enforcement of standards
- ❑ Monitoring and enforcement of performance
- ❑ Consumer consultation
- ❑ Publication of information
- ❑ Resolution of disputes
- ❑ Consultation with other regulatory bodies
- ❑ Advice on policy and standards

As is evident from the above list, the functions are often technical as well as economic. The key function, however, is invariably the setting of tariffs and enforcement of performance standards, and it is this core economic function which is the focus of interest in this report.

In general, a good regulatory system has several attributes:

- *Coherence* – the regulatory system should be able to set an appropriate combination of tariffs and subsidies and service standards and coverage, such that service providers are able to recover their costs and customers receive the services they are willing to pay for
- *Predictability* – regulatory decisions needs to be based on clear rules and precedence and are consistent so that service providers can make investment decisions that would improve service quality and operational efficiency
- *Independence* – the regulator needs to have a clear legal mandate and is autonomous in its financing and staffing, and is not beholden to others in its decision making
- *Transparency and accountability* – the regulator needs to be transparent in its decisions and rulings, and has to be accountable to both the customers and service providers.

***Relevance for Zimbabwe***: The Medium Term Plan (2011-2015) talks of the establishment of a water and sanitation regulator – it is understood that the exact institutional form is still being debated. Whatever the form that is ultimately chosen (multi-sector regulator, stand-alone water services regulator, regulation from within government structures or regulation by contract) the principles and functions of a professional, independent regulator should be incorporated in the enabling legislation and the establishing and operation of the regulatory framework.

## 5.3 Approaches to tariff regulation

There are several approaches to tariff regulation that are commonly used: cost-of-service (or often called rate-of-return) regulation, price cap (or revenue cap) regulation and performance of yardstick regulation. Incentive regulation has become more and more popular, as it provides motivation for service providers to improve performance efficiencies and service quality. Price cap regulation and yardstick regulation are forms of incentive regulation, while cost of service regulation provides less incentive for improvements in performance and service quality.

Each of these, along with advantage and disadvantages, is discussed below.

### 5.3.1 Cost of service regulation

Sectors which have not previously been subject to formal regulation, and/or where prices historically have been well below cost recovery levels, typically start with cost plus tariff regulation. This gets the sector back into some sort of financial shape but incorporates some perverse incentives.

The aim of this approach is to allow water utilities to recover its costs plus a reasonable rate of return. Tariffs are calculated based on historical costs of the utility, allowing for some return on investments. The cost-plus formula is usually works for one year. Tariff adjustments are automatic, as it is calculated for the next tariff cycle to include changes in input costs (such as electricity costs or inflation).

The main advantage of the cost-of-service regulation is that it is simple for every party involved. The cost-plus formula is simple for the utility to develop and easy for the regulator to approve and review. It is also easy for the public to understand what is covered by the tariff they are paying.

However, this approach to tariff regulation has several disadvantages:

- ❑ It does not provide incentives for utilities to improve efficiency and reduce costs, as its profit is generally set as a percentage of costs
- ❑ Information asymmetry between regulator and utility may lead to utilities overstating their costs and over invest in un-necessary capital investments
- ❑ Frequent tariff adjustments requires large amount of effort on both the utilities and the regulator
- ❑ At times of general inflation of costs and prices, there can be difficulties of regulatory lag if tariff is not adjustment frequently.

Despite these disadvantages, due to its simplicity and perceived transparency, this type of tariff regulation is still widely used in the United States, Canada and in many African countries. **Box 6** provides an example of cost-of-service regulation in Zambia.

**Box 6 Cost-of-service regulation in Zambia**

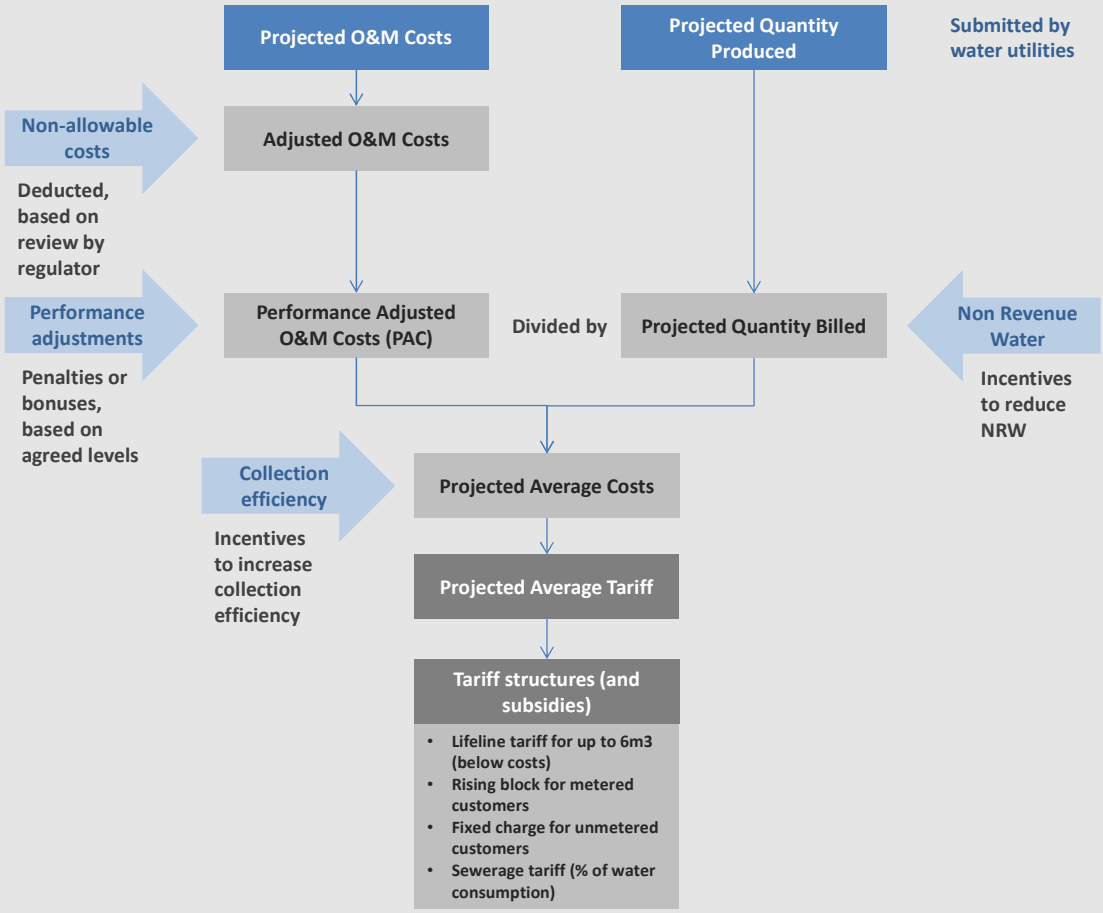
The National Water Supply & Sanitation Council (NWASCO) is the regulatory authority in Zambia and is responsible for developing a guideline for setting tariffs for water supply and sanitation. NWASCO adopted the cost-of-service approach to tariff setting as it permits NWASCO to balance the competing objectives of affordability of service and the financial viability of service provision by allowing the utility a degree of flexibility in conducting business.

The process of tariff setting based on the cost-of-service regulation has the following steps (as illustrated in the diagram below):

- ❑ Analyse water supply and sanitation costs of the utility and eliminate all unjustifiable costs
- ❑ Determine a fair and reasonable rate of return for the utility
- ❑ Calculate cost of service and average tariff by using consumption quantities (estimated demand)
- ❑ Develop a tariff structure that will generate enough revenue to cover the costs

and provide a reasonable rate of return

- ❑ Set tariff for first consumption block to be below costs in order to meet social and equity objectives.




Many of the water utilities in Zambia are still unable to meet their O&M costs. Therefore, the aim of this process is to initially allow utilities to cover their O&M costs, with progression to full cost recovery that include a reasonable rate of return.

As shown in the diagram, the process includes built-in incentive regime, in which the utilities has to meet certain performance standards in order to be allowed to charge the tariff they propose. Penalty is enforced for under performance in the form of "freezing" the tariff for the under-performing utility until such time that the performance standard is met.

Source: adapted from *Guidelines for Tariff Setting*, NWASCO, 2010

### 5.3.2 Price cap regulation

The price cap regulation sets an upper limit on the price utilities are allowed to charge its customers. This approach requires the regulator to set the price cap, and the utilities are allowed flexibility in how they use the revenue collected. The price cap approach is applied for a longer period than the cost-of-service approach, usually for between 3 and 5 years.

The main characteristics and benefits of the price-cap regulation include:

- ❑ Maximum allowable average tariff is set for a number of years (usually 3-5 years)
- ❑ Maximum allowable average tariff is calculated as forward looking, taking into account increases in demands, and possible increases in price of inputs and requirements for new investments
- ❑ Regular tariff reviews occur at the end of the tariff period, when a new maximum average tariff would be set for the next period
- ❑ Provides incentives to service providers to improve efficiency because cost reductions will increase profit. In a publicly owned utility, price cap arrangements often include incentive schemes for senior managers. When the price cap targets are exceeded, managers share in the additional revenue that accrues via bonuses.

The price cap regulation does not, however, solve the information asymmetry problem, in that the regulator relies on information provided by the utilities regarding its operation practices, costs and investment needs. Another disadvantage is that since the utilities' profits depend on their costs, the price cap approach may provide incentives for the utilities to cut costs on items that will affect service quality and performance. **Box 7** compares the difficulties in implementing the cost-of-service (or rate of return) regulation and the price cap regulation.

In most cases, to prevent deterioration in service quality and performance of the utilities, the price cap approach is usually accompanied by performance standards that the utility will have to meet and penalties for under performance. Price cap regulation is used in the United Kingdom and in Australia.

**Box 7: Comparison between rate of return and price cap regulations**

A study is done by the Centre on Regulation and Competition on the different methods of price regulation. The study used a questionnaire that was distributed to 99 developing and transition countries, and collects information regarding the use of rate of return and price cap regulation, as well as sliding scale and direct government pricing approach to regulation. The questionnaire used in the study asks about difficulties in each approach to price regulation. The result compares difficulties between rate of return and price cap regulation, as shown in the table below.

| Difficulties: | Price cap | Rate of Return Regulation |
|---|---|---|
| Information asymmetries or inadequate information on the firm's costs and revenues | 23 (96%) | 10 (59%) |
| Enterprises providing misleading information | 14 (58%) | 8 (47%) |
| Serious levels of customer complaints about rising prices | 17 (71%) | 8 (47%) |
| Enterprises earning excessive profits | 4 (17%) | 4 (24%) |
| Enterprises over-recruiting labour | 4 (17%) | 3 (18%) |
| Enterprises under-recruiting labour | 2 (8%) | 3 (18%) |
| Enterprises over investing in capital equipment | 4 (17%) | 9 (53%) |
| Enterprises under investing in capital equipment | 10 (42%) | 2 (12%) |
| Excessive rises in the pay of senior management | 3 (13%) | 6 (35%) |
| Problems with quality of service | 12 (50%) | 6 (35%) |
| Inability to recruit staff skilled in the management of regulation | 4 (17%) | 3 (18%) |
| Political pressures e.g. ministerial intervention in setting prices | 15 (58%) | 7 (41%) |
| | | |
| Total number of difficulties reported | 112 | 69 |
| | | |

Source: Kirkpatrick, C., Parker, D., Zhang, Y., *Price and Profit Regulation in Developing and Transition Economies, Methods Used and Problems Faced: A Survey of the Regulators*, Centre on Regulation and Competition, 2004

### 5.3.3 Performance and yardstick based approaches

Performance or yardstick based regulation is also known as competition by comparison, whereby it seeks to provide an incentive for utilities to lower costs and improves efficiency by inducing them to compete with one another for cost reductions. The tariff allowed for each utility is related to that utility's costs and to the costs of other utilities under the regulatory regime. For example, each utility would be able to set a price equal to the mean unit cost of all utilities in the group. This will provide incentive to lower its own costs, as it is the residual claimant of any excess of price over own unit costs that would determine its profit.

One problem with yardstick competition in water, however, is that it cannot be assumed that the exogenous factors that affecting companies' costs are correlated. Local differences in climate, topography and other endowments affect underlying cost and demand conditions, and make comparisons difficult. Yardstick competition also requires that companies not collude, suggesting that operators within a country should have different owners.

In common with other regulatory structures, yardstick regulation requires starting point information about the relativity of revenues to costs and industry-wide growth estimates. In addition, successful implementation requires that the regulatory body sort out which cost factors are beyond the control of management, and this requires detailed knowledge of the particular cost circumstances of the various utilities in the yardstick pool and the application of appropriate techniques.

**Box 8: Water sector performance evaluation and comparison in Peru**

In order to effectively monitor the monopoly suppliers and improve their firm performance, in 1992 the Peru government created SUNASS (Superintendencia Nacional de Servicios de Saneamiento) to regulate water and sanitation services. SUNASS attempts to ensure that consumers receive the best possible drinking water and sewerage service, in terms of adequate quality, quantity, continuity, coverage, and fair price. Its functions include economic regulation, supervision, sanctions, setting rules/norms, and dispute resolution (between customers and service providers). This agency's funding comes from a 1% surcharge on the invoicing from the service providers. The agency's Board of Directors has five members: two from the First Ministry Office (one is appointed as Chairman), one from the Ministry of Finance, one from the Ministry of Housing, Construction and Sanitation, and another one from the Office of Fair Competition.

To promote better performance, SUNASS developed a Management Indicators System (MIS) with the help of the World Bank. The MIS collects data from utilities, making it possible to compare service providers. The expectation was that low efficiency companies would gradually improve in response to greater pressure to perform efficiently. SUNASS selected nine performance indicators and categorized them into four dimensions:

1. *Quality of Service* includes three variables: compliance with the residual chlorine rule, continuity of service, and percentage of water receiving chemical treatment.

2. *Coverage of Service Attained* consists of two variables: water coverage and sewerage coverage.

3. *Management Efficiency* reflects three variables: operating efficiency (a combination of continuity of service and the volume of water produced to serve each person at a connection), percentage of connections with meter installed, and the ratio of bills not yet collected to the total number of bills.

4. *Managerial Finance Efficiency* is defined by the ratio of direct costs and other expenses to revenues.

The first two broad areas of efficiency are intended to represent the interests of society. The third reflects the companies' performance, and the fourth represents the citizen-owner's perspective. In order to obtain a single measure of performance, each indicator expressed as a percentage is multiplied by its weight (equal weight=1) and added together to obtain a

total score for each company. This total per company is divided by nine, the number of indicators, to get the final score. The emphasis on social concerns is evident in the greater number of indicators related to performance affecting society.

Source: Lin, C., Berg, S. V., *Incorporating Service Quality into Yardstick Regulation: An Application to the Peru Water Sector*, 2008

***Relevance for Zimbabwe***: Initially, cost-of-service regulation may be the most appropriate approach to regulation in Zimbabwe, as water utilities need to start recovering their costs. Once O&M cost recovery is achieved, an incentive regulatory approach can be introduced to further improve efficiency and service performance, but at this point this should be regarded as a long-term objective.

## 5.4 Tariff review procedures

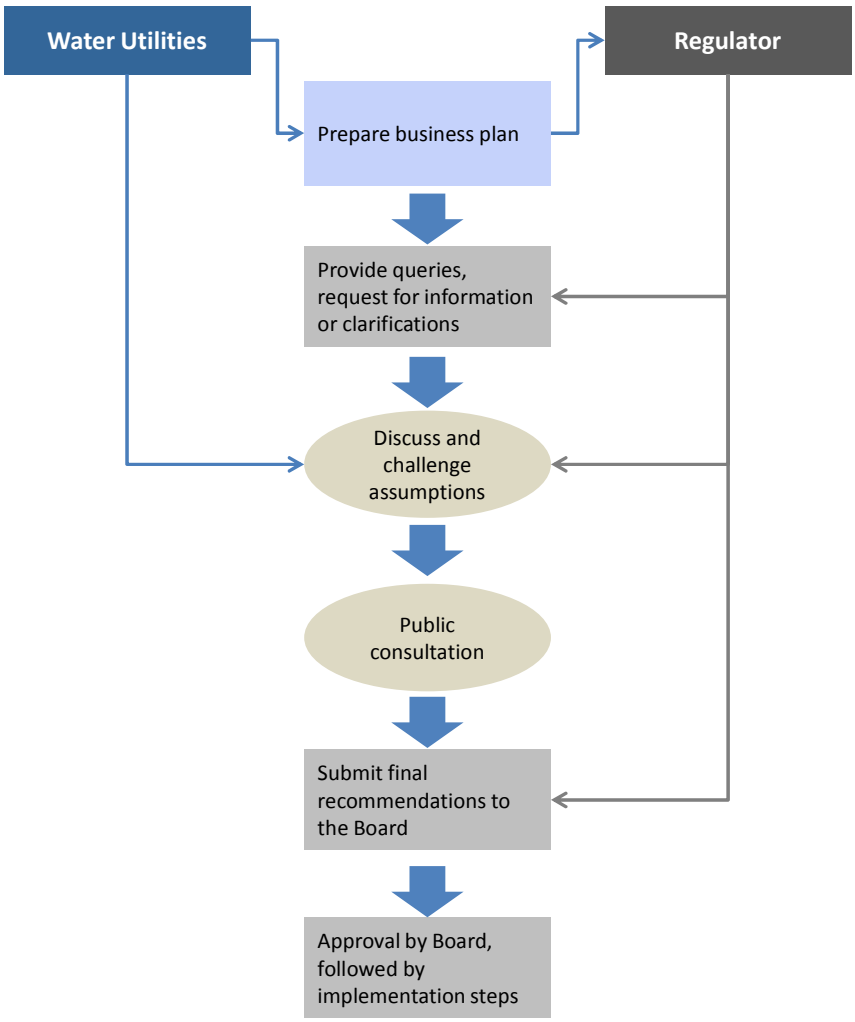
Regulatory agencies fulfil various functions, but the main element of economic regulation is the setting of tariffs, or more commonly the establishment of a tariff methodology and the approval of tariffs which have been prepared in conformity with that methodology. Tariff reviews are conducted to make that determination and allow for tariff adjustments to reflect changes in utility costs, inflation, or to account for extraordinary events. There are several types of tariff reviews, as explained below.

### 5.4.1 Periodic Tariff Reviews (PTR)

Periodic Tariff Reviews (PTRs) are the main, regular processes through which tariffs and subsidies are set so as to enable water utilities to achieve agreed outputs. The outputs include attaining target levels of service, achieving specified efficiency improvements and implementing a pre-defined series of asset replacements and new investment projects.

In general, the PTR requires the water utility to submit to the regulator a business plan, which includes its costs, expected revenues and any investment requirements for the next tariff period (see **Box 9**). The regulator will review the business plan and provide queries to the water utilities, along with any information requests or clarifications needed from the business plan. A discussion will follow between the regulator and the water utility, where the regulator may challenge the key assumptions in the business plan regarding the proposed new tariff level or tariff structure. A public consultation will also typically be required. Once the regulatory staff are satisfied, they submit their final recommendation to its Board for approval. Once the new tariff is approved, there will be steps involved in putting the new tariff into effect, such as issuing a Gazette or statutory instrument. These steps for PTR are illustrated in Figure 16.

**Figure 16: Main steps in a periodic tariff review**




The process from receipt of the water utility submission to submission of final recommendations approximately may take of the order of 5 months. The results of the review are reflected in the final recommendations, which may include:

- ❑ Changes to service levels for customers
- ❑ Changes to water quality
- ❑ Major projects to be undertaken
- ❑ Other improvements in supply, such as reduced losses
- ❑ Human resource improvements
- ❑ Changes to operational and maintenance costs
- ❑ Improvements in revenue collection
- ❑ Changes in tariffs and subsidies

- ❑ Effect of these changes on consumers, particularly poor households

**Box 9: Regular tariff review – typical submission requirements**

**I. Strategic Objectives**

- Demand objectives (matching growing demand and improving levels of service)
- Human resources development objectives
- Financial and commercial performance improvements (improving other performance indicators)

**II. Plan for achieving objectives**

- Supply plan
  - Water balance projections
  - Current supply capacity
  - Strategy for reducing non-revenue water, including annual targets
  - Strategy for improving water quality
- Investment programmes required by supply plan
  - Infrastructure renewal and maintenance
  - New investments
- Skills enhancement strategy

**III. Cost of delivering objectives**

- Investment costs
- Operational expenditure
- Discussion of inflation assumptions

**IV. Revenue Strategy**

- Maximising all water and sanitation revenues
- Tariff increases deemed to be necessary
- Changes (if any) to customer categories and to structure
- Improving billing and collection of tariff and connection fee revenues

**V. Overall projected financial performance for period of regular reviews**

- Calculation of the gap between the projected direct revenue of the service provider (Section IV) and costs required to meet strategic objectives (Section III)

**VI. Achieving the right balance for customers between tariffs and service levels**

- Key aspects of customer satisfaction, affordability and willingness to pay
- Trade-offs between tariffs and speed of improving services and target levels

**VII. Financing plan**

- Total financial resource requirements
- Sources of financing

  - Internal tariff revenues
  - PSIP
  - Donors
- Options / scenarios for any gap

**VIII. Long-term perspective**

- Longer term developments in demand
- Perspective on efficiency gains and investments needed to meet demand growth

Source: Adapted from *Institutional Capacity Building of the Egyptian Water and Wastewater Regulatory Agency – Phase I; Tariff-Subsidy Review Framework and Approach*, prepared for EWRA, 2009

### 5.4.2 Annual Automatic Tariff Adjustment (ATA)

The Automatic Tariff Adjustment (ATA) formula is a means of protecting the water utility from being adversely affected by inflation. If there were no ATA formula and tariff increases are made only every 3-5 years through PTRs, the financial benefits to the water utilities of any tariff increase that might be awarded would quickly be eroded by inflation. The ATA is intended to keep the value of the tariff fixed in 'real' or 'purchasing power parity' terms. The ATA is the means for keeping the purchasing power of the tariff fixed.

### 5.4.3 Extraordinary Tariff Review (ETR)

An Extraordinary Tariff Review (ETR) will only take place in exceptional circumstances, and is an unscheduled review that takes place between the scheduled Periodic Tariff Reviews. The circumstances in which ETRs would be warranted are laid out in the form of agreement between the regulator and the water utilities, or are set out in policy document or legislation.

***Relevance for Zimbabwe***: It is relevant for Zimbabwe to have a formal system of establishing tariffs for urban W&S departments. Major 'periodic' reviews can be held every 3 to 5 years: these involve significant business planning efforts and extensive public consultation. In the intervening years, tariffs can be monitored and adjusted only if significantly out of line with the conditions foreseen at the time of the previous review. Starting from a rate of return approach, the multi-year tariffs will facilitate a transition in due course to a price cap or incentive approach.

A directive form of yardstick tariff-setting would not be useful, but the introduction of benchmarking to encourage voluntary emulation of best performance would be extremely useful. This is discussed and illustrated in the next section, and a recommendation made on how this could be introduced immediately, without having to wait for the long process of agreeing upon and establishing a fully fledged regulator.

## 5.5 Monitoring and benchmarking of performance

Between regular reviews, the utility is required to provide regulator information, particularly on progress in improvement in Key Performance Indicators (KPIs). This can effectively be used for making comparisons between utilities within Zimbabwe and comparable utilities in neighbouring countries.

***Benchmarking*** is one of the most effective, light-handed ways for a regulator to achieve the goal of efficiency improvement amongst water utilities. Benchmarking has been used to monitor and compare water utilities performances worldwide, and becoming more and more popular in developing countries as a form or regulation. Internationally, one of the most comprehensive water and sanitation utility benchmarking is provided by the International Benchmarking Network for Water and Sanitation Utilities (IBNET).

The main objectives of benchmarking can be summarised as:

- ❑ To provide a set of KPIs related to a utility's managerial, financial , operational and regulatory activities that can be used to measure internal performance and provide managerial guidance
- ❑ To enable a utility to compare its performance on KPIs with those other relevant utilities to identify areas that need improvements, with the expectation of developing more efficient or effective methods to formulate and attain utility's objective and goals.

The key in benchmarking is to have well defined KPIs that are comparable between different utilities. KPIs are quantitative and often based on ratios and percentages. Table 14 provides a list of common KPIs used in water and sanitation utility benchmarking[6].

**Table 14: Common KPIs for benchmarking water and sanitation utilities**

| Key Performance Indicator | Description |
|---|---|
| Non-Revenue Water (NRW) | Non-revenue water is water supplied by a utility for which no charge can be levied. It includes unaccounted for water (UfW) but also includes water for public purpose (eg fire hydrants) |
| Water Quality Standards | Measures utility compliance with water quality standards, such as international drinking water standards |
| Service Coverage | For both water supply and sanitation, measured in percentage of households served in service area |

[6] A literature review and comprehensive list of benchmarks is provided in Belindah Ncube *Assessment of Performance of Urban Water Supply in the City Of Bulawayo, Zimbabwe* MSc thesis, Waternet, July 2011

| Key Performance Indicator | Description |
|---|---|
| Metering ratio | Percentage of customers with meters |
| Hours of Supply | Measures service quality, 24 hours continuous supply will be the target for most utilities |
| Staff per 1,000 connections | Measures labour efficiency of the utility, however care must be taken that utility have enough staff to maintain service levels |
| Collection Efficiency | Percentage of bills paid by billed customers, bad debts need to be recorded |
| Overall efficiency | Percentage of produced water on which revenue is actually collected. This measure combines the effects of NRW and collection efficiency. |
| O&M cost coverage | Percentage of operational and maintenance costs that are covered by billed revenue |

Two types of benchmarking can be distinguished:

- *Metric benchmarking* – comparison of utility's performance with that of other similar utilities, and tracking one utility's performance over time. This is an analytical tool, which can be used by regulators to compare utilities performance and track their year-to-year changes in performance. This type of benchmarking is used by WASREB in Kenya (see **Box 10**) and NWASCO in Zambia (see **Box 11**).

- *Process benchmarking* – comparison of the effectiveness of utility's processes and procedures for carrying out different functions. For example, a utility can compare its collection and billing system to other utilities to see which system performs better.

Benchmarking will be most effective when good quality data can be collected from utilities. It also requires good understanding of the methods used in comparing the data. In general, the proper approach to benchmarking involves three steps:

- Measure the real differences in performance among peers for key goals. This requires adequate knowledge of the peer group to ensure that the comparison is between "apples and apples."

- Investigate the reasons for the differences and develop strategies and tactics for improvements if organizations fall significantly below the best-practice standard drawn from analysis of the peer group.

- Implement definitive steps and programs to achieve needed improvements and carefully monitor the results. All projects of consequence should be monitored for performance to reveal what works and what doesn't.

**Box 10: Benchmarking against a set of standards in Kenya**

In Kenya, the Water Services Regulatory Board (WASREB) is responsible for monitoring the performance of water service providers (WSPs). Nine KPIs are used as the basis of a summary performance analysis and benchmarking of the WSPs: water coverage, sanitation coverage, Non-Revenue Water (NRW), water quality, hours of supply, metering ratio, (revenue) collection efficiency, operation and maintenance (O&M) cost coverage, and staffing (per 1000 connections).

These KPIs are used to set sector benchmarks and a scoring regime, which ranks the WSPs according to their performances. The table below shows the performance indicators, sector benchmarks and scoring criteria used by WASREB. A tenth KPI is also identified (personnel costs as a proportion of O&M costs).

| Indicator | | | Sector Benchmarks | | | Scoring Criteria | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Upper limit | | Lower limit | |
| | | | Good | Acceptable | Not Acceptable | Performance | Score | Performance | Score |
| 1 | Collection efficiency | | >90% | 85-90% | <85% | ≥90% | 30 | ≤50% | 0 |
| 2 | Non-Revenue Water (NRW) | | <20% | 20-25% | >25% | ≤20% | 30 | ≥70% | 0 |
| 3 | Water Quality | Drinking water quality | >95% | 90-95% | <90% | ≥95% | 20 | ≤80% | 0 |
| | | Compliance with residual chlorine test | >95% | 90-95% | <90% | ≥95% | 10 | ≤50% | 0 |
| 4 | Hours of Supply | Population>100,000 | 21-24 | 16-20 | <16 | 20-24hrs | 20 | ≤8hrs | 0 |
| | | Population<100,000 | 17-24 | 12-16 | <12 | 16-24hrs | 20 | ≤4hrs | 0 |
| 5 | O&M cost coverage | | ≥150% | 100-149% | <100% | ≥130% | 20 | ≤70% | 0 |
| 6 | Metering ratio | | 100% | 95-99% | <95% | 100 | 20 | ≤50% | 0 |
| 7 | Staffing( No per 1000 connection) | Large and very large WSP | <5 | 5-8 | >8 | ≤5 | 20 | ≥20 | 0 |
| | | Medium and small companies( with up to3 towns) | <7 | 7-11 | >11 | ≤7 | 20 | ≥20 | 0 |
| | | Medium and small companies( with more than 3 towns) | <9 | 9-14 | >14 | ≤9 | 20 | ≥25 | 0 |
| 8 | Water Coverage | | >90% | 80–90% | <80% | ≥90% | 20 | ≤30% | 0 |
| 9 | Sanitation Coverage | | >90% | 80–90% | <80% | ≥90% | 10 | ≤20% | 0 |
| | Total Maximum score: | | | | | | 200 | | |
| 10 | Personnel Cost as a % of (O&M) costs | Large and Very Large Companies | <20% | 20-30% | >30% | N/A | N/A | N/A | N/A |
| | | Medium Companies | <30% | 30-40% | >40% | | | | |
| | | Small Companies | <40% | 40-45% | >45% | | | | |

The scoring criteria show the upper and lower limit defined for each indicator and weighted scores assigned. Performance on of above the upper limit was awarded the maximum score while performance on or below the lower limit was awarded the minimum score. The aggregation of weighted scores for all nine KPIs is then used to rank the WSPs.

Source: WASREB, *IMPACT – A Performance Report of Kenya's Water Services Sub-Sector No.3*

**Box 11: Benchmarking performance indicators between utilities in Zambia**

Benchmarking water utilities' performance has been used in Zambia for 10 years, and has had a powerful effect in encouraging under-performing utilities to emulate the best performers. In order to create competition, NWASCO publishes an annual performance comparative report and has introduced awards for best performing providers. The table below provides an overview of KPIs used by NWASCO in benchmarking water utility performance.

| | UFW [%] | Trend | Water Quality Compliance# | Trend | Metering Ratio [%] | Trend | Water Service Coverage [%] | Trend | Sanitation Coverage [%] | Trend | Hours of supply | Trend | Staff per 1,000 water connections | Trend | Collection efficiency [%] | Trend | O+M Cost Coverage by Collection [%] | Trend |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LWSC | 43 | ↑ | 89 | ↑ | 62 | ↑ | 75 | ↑ | 65 | ↑ | 18 | ↑ | 11 | → | 75 | ↓ | 102 | ↓ |
| NWSC | 51 | ↓ | 97 | ↓ | 41 | ↓ | 90 | ↑ | 57 | ↑ | 16 | → | 8 | → | 83 | ↑ | 95 | ↑ |
| KWSC | 49 | ↓ | 92 | ↓ | 52 | ↑ | 87 | ↑ | 61 | ↑ | 15 | ↓ | 7 | → | 67 | ↓ | 105 | ↑ |
| MWSC | 40 | ↑ | 95 | ↑ | 60 | ↑ | 90 | ↑ | 81 | ↑ | 17 | → | 7 | → | 94 | ↑ | 129 | ↓ |
| LGWSC | 58 | ↓ | 95 | ↑ | 78 | ↑ | 66 | → | 21 | ↓ | 21 | ↑ | 12 | ↑ | 74 | ↓ | 77 | ↑ |
| SWSC | 35 | ↑ | 97 | ↑ | 74 | ↓ | 92 | ↑ | 61 | ↑ | 20 | ↑ | 8 | ↑ | 100 | ↑ | 106 | → |
| CHWSC | 44 | ↑ | 87 | ↓ | 41 | ↑ | 66 | ↑ | 22 | ↓ | 16 | → | 13 | ↑ | 91 | ↑ | 77 | ↑ |
| NWWSC | 34 | → | 99 | ↓ | 100 | → | 73 | ↑ | 22 | → | 23 | → | 11 | ↑ | 101 | ↓ | 93 | ↑ |
| WWSC | 45 | ↑ | 89 | ↑ | 14 | ↑ | 51 | ↓ | 22 | ↑ | 10 | → | 11 | ↓ | 75 | ↓ | 73 | ↓ |
| EWSC | 48 | ↑ | 86 | ↑ | 80 | ↑ | 65 | ↑ | 31 | ↑ | 17 | ↓ | 12 | ↓ | 99 | ↑ | 73 | ↑ |
| LPWSC | 67 | ↓ | 79 | - | 0 | → | 15 | ↓ | 8 | ↑ | 6 | ↑ | 17 | ↓ | 90 | ↑ | 48 | ↑ |
| Av. | 46 (w) | ↓ | 91 (s) | ↓ | 58(w) | ↑ | 76 (w) | ↑ | 53(w) | ↑ | 16 (s) | → | ** | | 84 (w) | ↓ | 105 (w) | ↓ |

Worse than the relevant average and benchmark not achieved (1 point)
Better than the relevant average but benchmark not achieved (3 points)
At least "acceptable" benchmark achieved (5 points)

(w) weighted average
(s) simple average
** Not applicable

A weighing factor, which includes sector benchmarks similar to that used in Kenya, is then applied to each KPI in order to rank the performance of the utilities. The ranking of utilities allows then to track their performance against their peer year-to-year. This has induced a sense of competition among service providers, which competition is a necessary ingredient for improved service delivery. Table below provides an example of the ranking of water utilities over the last four years.

| Commercial Utility | Ranking 2010/11 | Ranking 2009/10 | Ranking 2008/9 | Ranking 2007/8 |
|---|---|---|---|---|
| SWSC | 1 | 1 | 2 | 2 |
| MWSC | 2 | 3 | 3 | 5 |
| NWWSC | 3 | 2 | 1 | 1 |
| LGWSC | 4 | 6 | 7 | 8 |
| EWSC | 5 | 5 | 4 | 7 |
| NWSC | 6 | 4 | 5 | 3 |
| KWSC | 7 | 4 | 9 | 4 |
| LWSC | 8 | 8 | 6 | 6 |
| ChWSC | 9 | 10 | 10 | 9 |
| LPWSC | 10 | 9 | | N/A |
| WWSC | 11 | 7 | 8 | 8 |

By benchmarking each utility is motivated to improve its own previous performance as well as to outperform the other water utilities. Benchmarking is also used by NWASCO to set absolute sector targets to be achieved by the water utilities in a progressive manner. The comparative data in the Sector Reports also allows the consumers to compare the quality of service they are getting with other areas and to continue demanding for a better service provision.

Source: NWASCO, *Urban and Peri-urban Water Supply and Sanitation Sector Report 2001/2011*

In summary, the advantages of benchmarking include:

- ❑ Improve utility performances, by creating incentives to improve efficiency and service delivery
- ❑ Decrease in variance in performance across utilities, as under-performers strive to emulate its peer's performance
- ❑ Promote transparency as water utilities are required to submit financial, operational information that are compared and published
- ❑ Provide effective tool for the government for rationalising the use of scarce public resource, in terms of selecting utilities that requires funding and targeting the funds to achieve a particular performance improvement (for example to increase service coverage).

***Relevance for Zimbabwe***: Benchmarking in countries with which we are familiar, including Kenya and Zambia, has had a powerful effect in encouraging laggards to emulate the best performers, and the top utilities to keep improving so as to remain at the head of the league tables. Benchmarking reports generate a lot of interest in the press and public debate enhances accountability. This is an appropriate, low cost approach for Zimbabwe and is to be regarded as an important component in establishing systematic regulation of the urban W&S sector. Section 4.4 below has a number of comparative tables and is a first step towards introducing benchmarking in Zimbabwe's W&S sector.

## 5.6 Institutional form for regulating the water sector

For the regular, systematic and predictable updating of water and wastewater tariffs, and monitoring of service and performance standards, best practice is for an independent, professional regulatory body to be established. The commitment in the Medium Term Plan 2011-2015 to establish a "Water and Sanitation Regulatory Commission" is not cast in stone, because various institutional options remain under active consideration.

Some of the common institutional arrangements for regulation are summarised in Table 15, along with their pros and cons. To follow best practice, the institutional arrangements to be considered in this study are:

- ❑ Multi-sector regulator
- ❑ Singe-sector regulator
- ❑ Regulator within the government

In general, the agency responsible for regulation should be able to set rules and standards, to influence and monitor the market and the behaviour of the participants, as well as, to enforce rules whenever necessary.

In addition, another form of regulation that has been used in the water sector, namely *regulation by contract*, is also discussed.

**Table 15: Pros and cons of different institutional set up for regulation**

| Institutional Set-up | Pro | Con |
|---|---|---|
| No dedicated single regulatory institution but several institutions carry out regulatory functions | Distribution of functions according to existing capacity. Fast implementation possible. | Difficult to manage, needs high degree of cooperation and coordination. Distribution of functions according to existing structures and constraints might not be in line with long-term vision and comprehensive system. Almost impossible to put a full-fledged regulatory regime in place. |
| Regulatory agency is created, however it is not covering all regulatory functions | Allows for lean regulator, allows for utilisation of additional capacity within the sector. | Regulator is "tailored" to specific needs which increases the risk that he may not be effective. |
| Regulatory functions are concentrated within one single dedicated institution | Homogenous and comprehensive regulatory system. | Need for an effective control system If functions have to be transferred from existing institutions it may be time-consuming and expensive to do so. Change of legal and institutional framework necessary. |
| Multi-sector regulation | Economies can be realised across sectors. Advantage of resource sharing. Tentatively it is easier to assure autonomy from sector institutions. Procedures and arguments can be utilised across various sectors and in cooperation with different government institutions/ ministries. | Slow in setting up, "waiting for the slowest sector". Water and sanitation issues may not get the right priority in comparison to other sectors. Relationships and coordination with government institutions/ ministries is very complex. |
| Single-sector regulation | Can concentrate on the issues in the water sector. Can be set up faster because the process is less complex concentrating on one single sector. Simplified cooperation with Ministries. | Threat of regulatory capture by sector ministry, unless autonomy is sufficiently assured through legislation. |

Source: SOWAS, *Sharing the Experience on Regulation in the Water Sector*, 2004

### 5.6.1 Multi-sector regulator

The main advantage of a multi-sector regulator is that it reduces costs of regulation and generates synergies between sectors being regulated. A multi-sector regulator is useful when the capacity and skills required for modern regulation are scarce. In general, economic and legal regulatory skills are common to all infrastructure sectors; hence this can be leveraged by establishing a single economic regulatory institution. The issue of technical regulation, such as technical and service quality standards are sector specific, and therefore needs to be addressed by other agencies or by specialist sub-office within the multi-sector regulator.

Multi-sector regulators becoming increasingly popular in Africa, for example this form has been implemented in Ghana, Lesotho, Rwanda, and Tanzania. **Box 12** provides an example of the institutional arrangement of multi-sector regulator in Tanzania.

**Box 12: Institutional arrangement of multi-sector regulator in Tanzania**

The Energy and Water Utilities Regulatory Authority (EWURA) was established under the Energy and Water Utilities Regulatory Authority Act, Cap. 414 of the Laws of Tanzania (EWURA Act). EWURA is a multi-sector regulatory authority charged with the responsibility to regulate the electricity, petroleum, natural gas and water sectors, and is therefore also under the sector's legislation. The table below summarises EWURA's governing legislations in different sectors.

| Electricity | Water | Petroleum & Natural Gas |
|---|---|---|
| Cap 131 – Electricity Act | Cap 272 – Water Supply and Sanitation Act | Cap 328 – Petroleum Exploration and Production Act |
| | Cap 272 – The Waterworks Act | Cap 392 – The Petroleum (Conservation) Act |
| | Cap 273 – The Dar es Salaam Water and Sewerage Authority Act | Cap 392 – Petroleum Act |
| | Cap 331 – The Water Utilisation (Control and Regulation) Act | |

For all the sectors, EWURA's functions include, *inter alia*, tariff review, licensing, performance monitoring and enforcement of standards of regulated goods and services, taking into account service quality, safety, health and environmental conservation.

EWURA is a public institution and, therefore, governed by the Public Finance Act, 2002. The Authority's annual operations originate from its Strategic Plan covering a three-year horizon. The Annual Plan and Budget is approved by the EWURA Board and submitted to the Minister in line with the provisions of section 49 of the EWURA Act. Resources used to implement annual plans are derived from regulatory levies collected from consumers of regulated services. The outcome of the implementation of annual plans is presented to the Minister responsible for EWURA through an Annual Report and Accounts in line with the provisions of section 48 of the EWURA Act.

EWURA consists of a Board of Directors, with the Chairman appointed by the President for a period of 4 years, five non-executive members appointed by the Minister, and a Director-General appointed by the Board for a period of 4 years with approvals from sector Ministers. Both the Chairman and Director-General maybe be re-appointed for one more successive term.

Source: EWURA, *Annual Report 2009/2010,* and EWURA website: http://www.ewura.com/overview.html

However, the set-up of a multi-sector regulator, developing the regulatory tools for all sectors adequately, and the communication and coordination with stakeholders in the different sectors can be very difficult. This is illustrated by a peer group assessment of the multi-sector regulator in Ghana, summarised in **Box 13** (SOWAS

stands for the "GTZ Sector Network Water and Waste in Africa South of the Sahara").

**Box 13: Difficulties in operation of multi-sector regulator in Ghana**

Despite being in operation since 1997 the multi-sector regulator, Public Utilities Regulatory Commission or PURC, in Ghana so far failed to develop effective tools to promote improvement of performance in the water sector. By now PURC only published guidelines for disconnection and customer complaint procedures (both are the same for water and electricity). No specific guidelines, incentive schemes or other suitable tools, which could steer the water sector towards improved efficiency and availability of services, have been elaborated. One of the reasons lies in the fact that since its inception PURC clearly focuses more on energy than on water. This results in a very limited impact of water sector regulation in Ghana, apart from tariff adjustments, where PURC plays an active role.

PURC is financed by the Government. As it is the case with government funding in many countries PURC does not receive sufficient funds to cover the approved budget. This makes adequate planning and operation difficult and led to the resignation of 4 key staff because of erratic payment of salaries. This combined with the threat that the release of funds are linked to the willingness of the regulator to comply with instructions from politicians make effective regulation almost impossible and seriously limits the independence and authority of the regulator.

Source: SOWAS, *Sharing the Experience on Regulation in the Water Sector*, 2004

### 5.6.2 Single-sector regulator

In contrast to multi-sector regulators, a single-sector regulator can concentrate on issues in the water sector. Knowledge and understanding of the sector will enable the regulator to set appropriate tariffs and service standards that will be tailored to the sector and the performance of the sector. Another advantage is that setting up a single-sector regulator could be faster and less complicated, and communication and cooperation with relevant ministries and stakeholder will be simpler than that of a multi-sector regulator.

However, the 'closeness' of the regulator to the sector it is regulating could increase the risk of regulatory capture by the sector ministry or even the industry it is regulating. Hence it is important for a single-sector regulator to have its autonomy sufficiently assured through legislation.

Experiences from Kenya and Zambia, both with single-sector regulators, shows that well organised, professional and independent regulators can improve the sector's performance. **Box 10** and **Box 11** above describe performance indicators that both regulators used in their benchmarking activities.

**Box 14** provides an example of the set up costs and operations of NWASCO in Zambia.

**Box 14: Set up costs and operations of NWASCO, Zambia**

In Zambia, NWASCO is a single-sector regulatory agency responsible for regulating a water sector comprising 11 commercialised service providers and an additional 36 water schemes run by Local Authorities and private companies.

NWASCO was established in 2000, with the cost for the start-up phase as follow:

- ❑ Purchase of office building (440 m2, with 15 offices, documentary, 2 large meeting rooms, reception, kitchen and sanitary installations) and parking facilities of US$170,000
- ❑ Refurbishment of the office building of US$100,000, including network for PCs, security installations, outside arrangements like parking, gardening etc.
- ❑ Purchase and refurbishing of 3 containers as storage space US$13,000
- ❑ 6 cars (3 cars 4x4) for a value of US$120,000
- ❑ Office equipment like furniture, fixed workshop/presentation equipment, kitchen, telephone installation etc. for US$16,000
- ❑ 17 PC-workplaces for staff and advisors, documentary etc., server, lap tops, television, video, beamer, overhead projector etc. for US$55,000.

NWASCO is composed of a board and a management carrying out regulatory functions. With a board composed of 6 members (with 3 representative from the government and 3 representatives from industry and water users associations) overseeing the professionals carrying out regulation a clear line of separation between control and management of regulation has been drawn. Additionally, the representation of a large number of stakeholders ensures that the risk of capture is kept at a minimum and a high level of transparency is secured. The high level of autonomy of the regulator NWASCO was demonstrated in 2002, when a few months before general election tariff increases of up to 100% were approved.

NWASCO has a lean management structure consisting of 15 full time staff plus around 15 part time support staff. The lean structure has been designed to promote effectiveness and to cut down costs. NWASCO's expenditures are mostly covered by a fee collected from the providers. In 2010, total revenue collected covered around 93% of total expenditures. The remaining costs are covered by other revenues such as through sale of assets and funds granted by Government or donor agencies. The overall expenditure of NWASCO in 2010 was about US$ 1.6 million with personnel costs (53% of total costs) representing the biggest shares.

Within the first 3 years of operation, NWASCO issued the following guidelines, which has been continuously updated throughout its now 10 years of operation:

- Minimum Service Level (MSL)
- Tariff adjustment guidelines
- Corporate Governance of Commercial Utilities
- Business Planning guidelines
- Financial Projections
- Annual Reporting guidelines
- Investment Planning guidelines
- Water Supply for Peri-urban Areas
- Water Quality
- Human Resource Management Strategy

- Harmonisation of Accounting in order to make information comparable

Additionally, NWASCO organised repeated training to make providers understand the content of the documents. At the same time NWASCO used the feedback from these training sessions to verify their applicability.

Source: SOWAS, *Sharing the Experience on Regulation in the Water Sector*, 2004 and NWASCO, *Annual Report 2010*

### 5.6.3 Regulator within government

Regulatory functions can also be performed by government departments or agencies. Different regulatory functions can be distributed within the government according to existing capacity. However, this requires high coordination between government departments, which could be difficult depending on the structure of the government. It is also difficult to have a long term vision of the sector given that responsibilities are distributed amongst different institutions.

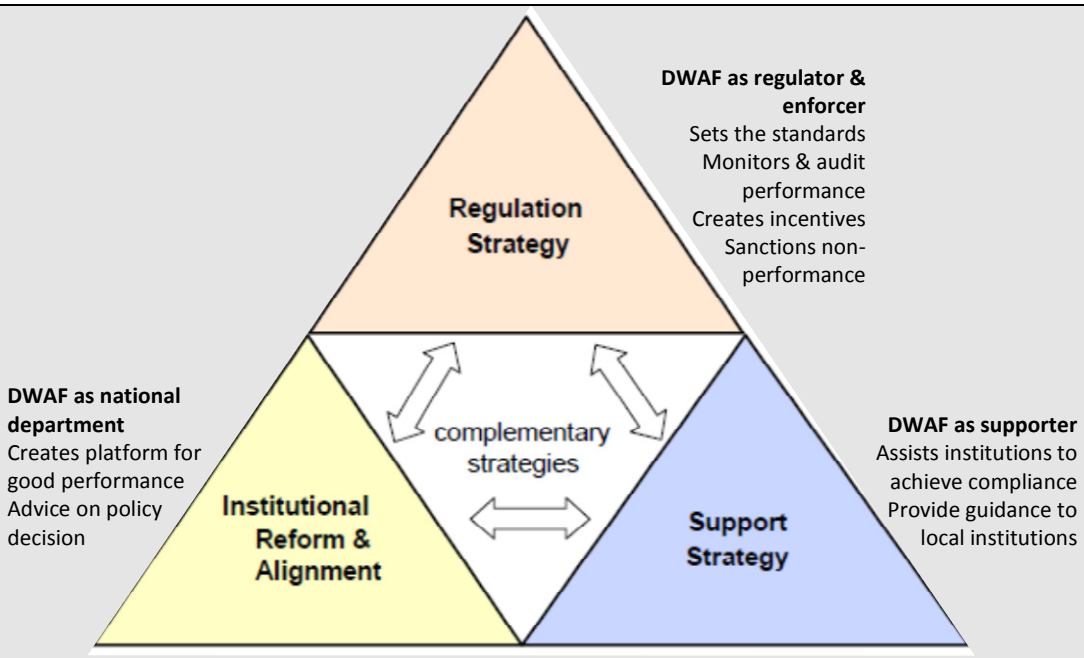
One of the main principles of regulation is the separation of policy making, monitoring, and service provision functions. It is important to separate these functions when regulating from within the government. A strong mandate based on legislation prescribing the function of each institution could ensure the autonomy and independence of the regulatory function.

**Box 15** illustrates an example of regulating water sector from within the government in South Africa.

**Box 15: Regulator within government structure in South Africa**

The National Water Act 1998 states that the National Government, acting through the Minister, is the public trustee of the nation's water resource. The Minister has delegated the powers and functions of water management to the Department of Water Affairs and Forestry (DWAF). The role of DWAF as water service regulator is strengthened by the Strategic Framework for Water Services 2003, which nominates DWAF to be the National Regulator of the water services sector and that DWAF will develop regulatory strategy for the water sector.

DWAF is also the national department that carries the authority over the sector, including developing sector policies, and in some cases is also a water service provider. The diagram below illustrates the functions of DWAF as regulator and as a national department that can influence policy decisions.




In performing its function as regulator, DWAF is responsible for defining and communication regulatory requirements, set and review rules, norms and standards, monitor compliance and performance and determine interventions. DWAF is also responsible for setting pricing rules and approving tariffs. According to the Water Services Act 1997, the regulation of potable water and sanitation should include:

- Level of service
- Interruptions
- Drinking water quality
- Disposal of grey water
- Effluents, use of effluent & analysis
- Water losses
- Waste water collection & treatment
- Tariff setting process & assessments

As a national government department, DWAF may delegate some of its functions to local governments, as prescribed by the Constitution. Hence, some of DWAF regulatory and water service provision functions are delegated to the Municipalities. The Municipalities are responsible for providing basic services, including water. Within a Municipality, the Water Services Authority (WSA) is the institution responsible for water services. Just as the DWAF represents the national government in water services, the WSA represents the Municipality.

The Strategic Framework for Water Services provides provisions for WSA as local regulator of water services. The WSA have the duties of ensuring that customers (including prospective customers) have efficient, cost-effective and reasonably prices and sustainable access to water services. WSAs may carry out the duties of water service provisions themselves, or may contract them out to public or private water service providers.

According to the WS Act, water service providers (WSPs) are public or private entities that supplies water services to customers or to other water services institutions. WSPs must obtain the approval of WSA to operate within a specific jurisdiction. Contracts between WSAs and WSPs include service level and performance standards that have to be met by WSP and monitored by WSA.

Source: African Centre of Water Research, *Review of Regulatory Aspects of the Water Services Sector*, 2009 and DWAF, *Where to with Water Services Regulation in South Africa,* 2008

### 5.6.4 Regulation by contract

Economic regulation can occur without a regulator. In such cases, the regulatory mechanism may involve:

- ❑ a contract with a privately owned service provider, or
- ❑ a performance contract/license with a publicly owned service provider.

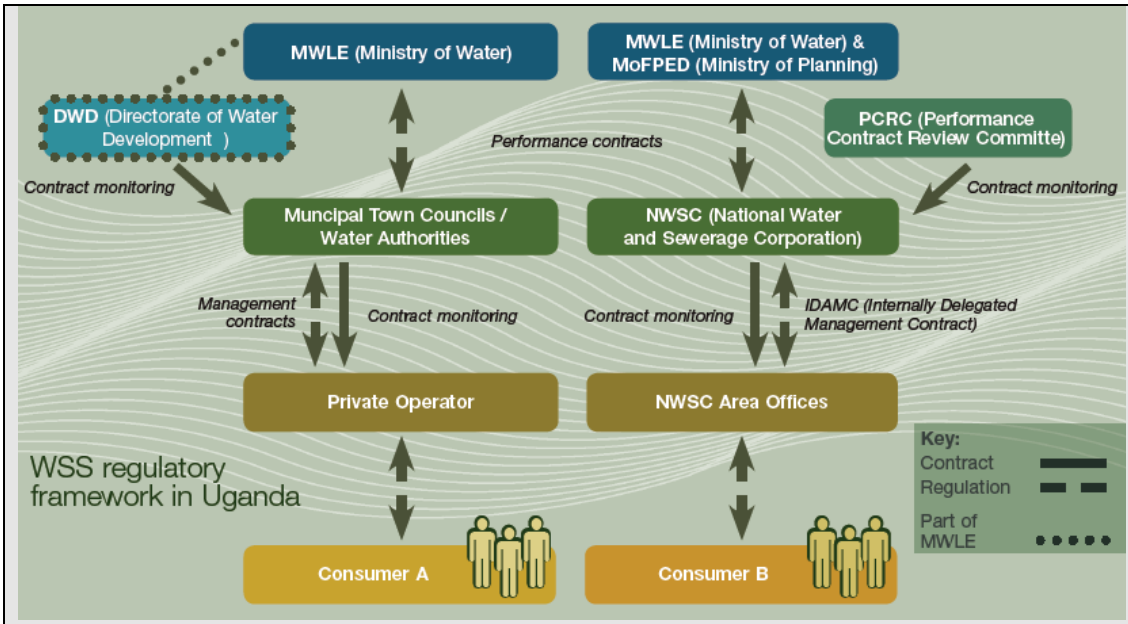
Legal instruments and rules can be used to set regulatory parameters, and organizational arrangements defined to achieve functionally similar regulatory results. Ways to make regulatory rules legally enforceable include statutes (passed by a legislature), contracts, licenses, and executive orders.

Instead of having a regulator to set the service and performance standards, these are included in the terms and conditions of the contract, which are agreed on by both parties to the contract. The contract often also contains formulas for controlling tariffs and some penalties if the minimum service and performance levels are not met. Performance contracts can also be designed to include incentives to achieve selected performance targets. This is an effective form of incentive regulation.

However, often this type of regulation still requires an independent regulator (or a government agency) to monitor the contract and ensure that both parties adhered to the terms and conditions of the contract. **Box 16** describes the regulatory framework in Uganda, which uses performance contracts between a government department and the publicly owned service provider.

**Box 16: Regulation by contract in Uganda**

In Uganda, regulatory by contract is the key regulatory mechanism. The main institutions in charge of regulation of the WSS sector are the Ministry of Water, Lands and Environment (MWLE), its technical arm, the Directorate of Water Development (DWD), the Performance Contract Review Committee (PCRC), as well as the service providers themselves (NWSC, water authorities). The diagram below illustrates the water supply and sanitation regulatory framework in Uganda.




The Water Act of 1995 puts DWD in charge of technical regulation in the sector. However, since 2000, part of the technical regulation is carried out via performance contracts between the MWLE or the Ministry of Finance, Planning and Economic Development (MoFPED) on the one hand and NWSC on the other hand.

The PCRC is tasked to monitor the contract performance between MWLE/MoFPED and NWSC using performance indicators. These include among others the coverage, Unaccounted for Water (UFW), collection efficiency, financial and operating efficiency, customer service and operational indicators. The MWLE is responsible for price regulation. Operating entities (NWSC and service providers) propose tariffs and the MWLE approves them.

The NWSC in return monitors its area offices under the Internally Delegated Area Management Contracts (IDAMCs) and the water authorities monitor the private sector operators through management contracts. The IDAMCs, established within each of the NWSC service areas, have a well-defined incentive mechanism that is based on "Minimum Performance Standards" and "Performance Targets". Under this system several key areas of performance are used to calculate incentive fees for the staff in each operating area. This incentive fee is over and above the base management contract fee, which include a 25% performance related component. The incentive fee provides an incentive for the operators to earn a bonus when the minimum performance standards are exceeded.

This regulatory setting has worked well in Uganda, with improved service quality standards from NWSC and other service providers. However, there are some concerns over the independence and autonomy of the policy decision making process. DWD is part of MWLE, which sets the overall water supply and sanitation policy, and but is also performing the function of contract monitoring. Similarly, it has been questioned whether PCRC, which is financed by the government, provides sufficiently robust means to oversee the performance contracts.

Source: GTZ, *Casesheet: Uganda – Regulation and Supervision in Water Supply and Sanitation (WSS)*, 2006

***Relevance for Zimbabwe:*** As was made clear at the Inception Presentation, the requirement of this study is to lay out the pros and cons of different arrangements and present international experience. It is intended that this part of the work will feed into the on-going debate on which institutional form best meets Zimbabwe's needs in the next few years and beyond. The discussion makes clear that there are many different aspects to consider. All options involve pros, cons and risks, and in the end it will be a judgment call on which option to select.

# 6 Recommendations and additional options for consideration

## 6.1 Recommendations

### 6.1.1 Context for recommendations

The recommendations of this study are formulated in the context of on-going debates about:

- ❑ the position, role and financing of Urban Local Councils;
- ❑ appropriate regulatory structures for urban W&S service delivery.

The status of ULCs cannot be resolved within the rubric of this study. As regards institutional arrangements for W&S regulation, we support further debate being conducted on this before a final decision is made. Following the vigorous debate about these issues at the workshop, the final section of this chapter lays out options for ringfencing and for regulation (see Section 6.2 below).

The recommendations made in this section are couched in the spirit of furthering national decentralisation goals:

- ❑ W&S tariffs are specific to the municipality, reflecting differential costs;
- ❑ decisions about tariff structure are to be decided at the local level.

Municipalities are committed to obtaining endorsement of tariff proposals from their residents. The consultation procedures before tariff changes are made are often quite exhaustive. We strongly recommend that such consultation be reinforced and continued.

### 6.1.2 Tariff structure

In the past, Zimbabwe has had a two part tariff (fixed monthly charge plus volumetric charges) with the volumetric part having multiple increasing blocks. We recommend that the structure should be made as simple as possible.

This would include, for IBT customers, having only 3 blocks. Even a simple IBT structure is quite demanding when estimating the revenue arising from a trial tariff structure. Assuming that the overall consumption of the customer category is known, with a 3 block structure with trial volumetric limits, the questions to be asked are:

- ❑ how much of the demand would fall into the lifeline block?
- ❑ how much of the demand would fall into the upper block?

The demand in the third block can then be found by subtraction from the customer category total. The addition of even one more block makes the exercise much more difficult.

A simple IBT structure is also easier for customers to understand and hence to respond to the in-built incentives to conserve water. Since the whole point of IBTs is to provide incentives to customers, it is important they understand the tariff structure and for this the simpler, the better.

The other objective of IBTs is to build-in ***cross-subsidies*** between and within customer categories. The level and structure of cross-subsidies needs to be thought through subsidies can be properly captured in the tariff models.

The municipalities all endorse the idea of having simple tariff structures for ease of implementation and for customer understanding. Different municipalities are presently experimenting with different structures: these should be monitored and the lessons learnt disseminated. There are also pilot projects being conducted in the use of prepayment meters (PPMs), some of which will be simple uniform tariff meters (Chegutu), while others wish to experiment with complex IBT tariffs combined with PPMs (Bulawayo).

### 6.1.3 Tariff level

In 2 of the municipalities, the models indicate that combined water and sewerage tariffs can be lowered slightly, in other cases increases of between 13% and 75% are required. These results are derived in a situation where the W&S systems are still in a precarious state, and many of the assumed numbers could change significantly. The calculated increases are very sensitive to certain key assumptions, notably the collection ration.

Taking account also of affordability issues, we do NOT recommend that ***water tariffs b***e changed rapidly. However, ***sewerage tariffs*** which are generally far too low, should be the first target of increases – this is best done when the sewage treatment works (STWs) which are presently not functioning are brought back into operation. The calculated sewage tariffs include provision for the higher level of operational costs which will apply when the STWs are in operation, so it is relevant to increase the tariffs when those higher costs begin to be incurred.

Water tariffs will need to be increased over time to underpin the improvements that form the basis of the calculations:

- ❑ reduced non-revenue water
- ❑ increased revenue collection
- ❑ increased infrastructure spending (to ensure sustainability)
- ❑ reduced transfers to other municipal functions

### 6.1.4 Asset valuations

The Asset Registers of the municipalities are generally in a poor state, and the values that are recorded are usually depreciated historical costs. There is thus no starting point for assessing what level of maintenance costs are warranted in order to ensure the future sustainability of the supply systems.

We recommend that the municipalities should all undertake asset revaluation exercises, updating their Asset Registers for water and sewerage assets, including reticulation (the biggest component of asset value). The values should be recorded and maintained in terms of replacement rather than historical costs. In future, this will form the basis for reliable assessments to be made of the levels of maintenance expenditure that are necessary and which should be allowed in revenue requirement calculations, and hence in tariffs.

### 6.1.5 Accounting ring fencing

We recommend that all municipalities improve their cost accounting so that the reported costs of W&S delivery are reliable. All of the Municipalities have made a commendable effort to separate W&S costs and revenues within the municipality accounts, but there are different assumptions made by different authorities, thereby compromising comparability. Part of the role of the regulator, or pending the establishment of a regulator UCAZ's Water Office (see below), would be to promulgate some guidelines for 'regulatory accounting' of W&S.

Transfers from the W&S account to finance other functions of the municipality should be clearly and fully reflected in the accounts. This is tantamount to saying that there should be full accounting separation for W&S. This would be essential if water revenues are to be fully ring-fenced, but is desirable even if W&S is to continue to cross-subsidise other municipal functions.

### 6.1.6 Immediate establishment of monitoring and benchmarking system

The benefits of a well functioning regulator would be professional and independent guidance of the development of the water and sewerage sector, but there are also risks. Further discussion and debate is needed before deciding on the regulatory structure which is most appropriate for Zimbabwe.

In the meantime, while this discussion and consensus building takes its course, we recommend that a monitoring and benchmarking system for urban water and sewerage provision be immediately established. An obvious home for this, with a high degree of municipal ownership, would be the secretariat of the Urban Councils Association of Zimbabwe (UCAZ). There are precedents in other countries for industry associations to do knowledge sharing and benchmarking, the National Performance Reports of the Water Services Association of Australia being a good example[7]. In Holland, the Association of Dutch Water Companies (Vereniging van

[7] https://www.wsaa.asn.au/Publications/Pages/default.aspx

waterbedrijven in Nederland - Vewin) gives advice and does research to assist water companies to comply with national standards, as well as publishing comparative information about its 10 member companies[8].

The suggestion that UCAZ establish a Water Office has already been endorsed by the Board of UCAZ at its meeting in December 2011 at Victoria Falls. The Water Office could quickly establish a monitoring system and publishing regular bulletins which would:

- ❑ benchmark the comparative performance of W&S providers
- ❑ disseminate useful experience, for example the lessons learnt from pilot projects on pre-payment meters.

UCAZ has indicated that the Water Office functions will also include taking over from UNICEF the bulk procurement of water treatment chemicals for Zimbabwe's municipalities.

### 6.1.7 Quick wins

As extensively discussed at the main Workshop, Municipalities should look out for opportunities to rapidly increase their revenue flow while expending relatively modest amounts to bring about the improvement. Replacement of broken or missing meters, whether by conventional or prepayment meters, is a case in point. Putting customers on to a volumetric tariff instead of a fixed (estimated) level is expected to reduce technical losses allowing other customers to be supplied and to start contributing to revenues. There are other municipality-specific quick win options which should also be pursued.

If no other financing is available for such 'quick win' strategies, it would be worth temporarily reducing transfers from W&S to other services in the municipality in order to significantly increase overall revenues. Building on the quick win experience and the ADB and other investment projects which are about to take place, medium and long-term prioritised investment plans are to be drawn up.

## 6.2 Ringfencing and regulatory options

In response to requests made at the stakeholder workshop, this section presents tables of options for ringfencing and for regulation of the urban water and sewerage sector. It is intended that these tables will assist the major players to thoroughly assess the pros and cons of the various options and for this understanding to deepen the debate that is held before firm decisions are made.

[8] http://www.vewin.nl/english/Publications/Pages/default.aspx

**Table 16 Ringfencing options**

| # | Option | Pros / benefits | Cons / costs | Remarks |
|---|---|---|---|---|
| 1 | ***Status quo*** | No change needed | Lack of clarity on the financial viability of W&S | There is variation on the degree of clarity across the municipalities. |
| 2 | ***Ringfenced accounting*** with transfers to other accounts allowed, but must be transparent | Precise assessment possible of the financial status of W&S | Requires setting up more effective and accurate cost accounting | We strongly recommend ringfenced accounting. Useful in its own right and essential if options 3 and/or 4 are to be pursued. |
| 3 | ***Full ringfencing*** - ringfenced accounting with all W&S revenues earmarked for W&S purposes only | Any surpluses in the W&S account are committed to rehabilitation and expansion of W&S | Requires alternative sources of funding to be put in place first – some combination ***of central government transfers*** and ***higher rates*** (which will not be popular or easily collected from residents) | Public education will be required to make the transition from low rates and W&S cross-subsidies to higher rates sufficient to meet costs of non-W&S municipal services. Central government transfers would limit the rate increases required. |
| 4 | ***Unbundling*** – W&S departments removed and registered under the Companies Act | Provides a more commercial, customer-oriented focus for the provision of W&S services | Would mean separate overhead services such as legal, financial and stores, as well as separate billing and collection, raising costs. Separation would reduce the leverage that presently exists when water can be disconnected to put pressure on households to pay their rates. Could well undermine credit worthiness of municipalities. | Benefits of unbundling greatest if there is full separation, but in other countries there are lease fees paid to the municipality and other legacy issues. Unbundling only appropriate for large W&S departments – in smaller municipalities, W&S being integrated offers economies of scale and scope for overall municipal service provision. |

**Table 17 Regulatory options**

| # | Option | Pros / benefits | Cons / costs | Remarks |
|---|---|---|---|---|
| 1 | ***Status quo*** | No change required | Inconsistencies between major pieces of legislation create uncertainty and inconsistency | Consensus on a number of issues needs to be developed before the harmonisation of legislation affecting urban water is attempted |
| 2 | ***Regulatory framework*** for W&S, but no stand-alone regulatory institution. Variants - tariffs decided by:<br>▪ central government<br>▪ municipalities | Least radical option, closest to what municipalities currently want and therefore easily implemented | Need to identify central government responsibility more clearly and define powers carefully in enabling legislation | Municipalities want to retain tariff-setting with accountability to their residents – scope, though, for some oversight from central government. This to include specifying the principles and methodology to be followed in calculating new tariffs. |
| 3 | ***Regulatory institution*** – variants are:<br>▪ sector-specific<br>▪ multi-sector | Sector-specific regulator would be easier to establish – multi-sector would require negotiating with other sectors and having more complex enabling legislation | Multi-sector regulator makes best use of scarce professional regulatory skills, but if the regulator is 'captured' by political or business then all the sectors covered are adversely affected | Professionalism and independence from immediate political pressures much easier to achieve in a stand-alone regulator.<br><br>More detail on the pros and cons of the regulatory options are given in Section 5.6 |
| 4 | ***Regulation by contract*** | This can be combined with other options – the entity letting the contract could be a government Ministry or a regulatory institution | Much depends on the quality of the contract. A badly formulated contract can lock in consumers into a cycle of poor performance by the service provider. | Performance incentives can readily be included in the contract framework. This allows the authorities to remain in 'hands-off' mode, because the basis is in place for self-generating on-going performance improvements. |

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# A2 Further details on the 7 municipalities

## A2.1 Harare Water

Harare Water supplies the City of Harare and also provides bulk treated water to Chitungwiza, Norton, Ruwa and Epworth. It is responsible for sewage collection and treatment for the City of Harare.

Most water is produced at the Morton Jaffray Water Treatment Plant which draws from Lake Chivero and Lake Manyame on the Manyame River. A smaller plant called Prince Edward draws from Lakes Seke and Harava further upstream on the Manyame River. The design capacity of the water treatment plants is 714 Ml/day and at present the production is 610 Ml/day, supplying a population that Harare Water estimates to be 4 million people. After allowing for water supplied to the other local authorities, water put into the system is equivalent to 3,220 litre per connection per day. Harare Water estimate that there are 30,000 unmetered connections and taking this into account water put into the system is 2,947 litre per connection per day.

Non revenue water is estimated to be 59% of which 29% is believed to be technical losses and 30% commercial losses. Harare Water estimate that unrestricted demand is 1,600 Ml/day. Much of the low density suburbs receive water rarely or not at all and the residents depend on boreholes or purchased water from private tankers. If water supplies are returned to these areas, those paying for costly tankered water will revert to the piped supply. It is likely that those on boreholes will not return to municipal water. Water supply is also poor in some of the high density housing areas where residents rely on water carried from boreholes with hand pumps, shallow wells or surface water. The latter two are unprotected and use of water form them puts the population at great risk of disease.

The northern and eastern low density suburbs are on septic tanks but the rest of the city is on piped sewerage, most of which drains to two large treatment plants at Crowborough and Firle. Some areas drain to waste stabilisation ponds. The design capacity of the two main sewage treatment plants is 198 Ml/day, although ten years ago the flows were well in excess of their design capacity. In 2009, neither was working and all sewage was discharging untreated to Lake Chivero . At present, 54 Ml/day is being treated. A significant amount of sewage is spilling to streams from blocked sewers and failed pump stations. This adds to the risk of disease and contributes to the pollution of Lake Chivero. The pollution of Harare's main water source in Lake Chivero results in high chemical consumption at the Morton Jaffray water treatment plant.

The next source is the Kunzwi Scheme to the east of Harare on the Nyagui River which is expected to yield 300 Ml/day at a cost of $450 million. (300 Ml/day is an over-estimate as it does not take into account prior commitments in the catchment). Harare is looking for funding outside Zimbabwe for this scheme. After Kunzwi, the next source identified is Musami Dam on the Shawanoe River to the east of Kunzwi, with a yield of 500 Ml/day. Thereafter a much bigger source will be developed

some distance downstream at Mazowe/Nyagui. Harare intends to address non revenue water by renewing old and leaking parts of the network and by installing new water meters. It is also planning to increase production at the water treatment plants and to rehabilitate and augment sewage treatment.

## A2.2 Bulawayo

Bulawayo is situated in a dry part of the country and several times in the last few decades it has been close to exhausting its supply dams in drought periods. Current sources are surface water from five dams to the south east of the city, supplemented by a small amount of water from an aquifer to the north. There is a sixth dam to the south of the city from which a pipeline is being built that will supplement supply by the end of 2011. Water from the dams is transferred to the Ncema plant. Two pipelines deliver raw water to the biggest water treatment plant at Criterion. An older, smaller plant at Ncema treats and pumps to Tuli Hill Reservoirs. Most of the city receives water by gravity from Tuli Hill and Criterion Reservoirs with the exception of some small areas on high ground that are supplied by booster pumps.

The design capacity of the water transfer and treatment systems is 250 Ml/day although rehabilitation will be needed to bring actual capacity to this level. Current delivery into the system is 135 Ml/day. Demand is constrained by rationing, loss of industry and a habit of conservation by consumers resulting from many years of rationing. The estimated unrestricted demand is 160 Ml/day. Water put into supply is equivalent to 843litres per connection per day. Remarkably, Bulawayo maintains all its reservoirs at more than 80% full and all consumers receive water 24 hours a day. Supply per connection is 26% of the amount that Harare Water reports and yet Harare is unable to provide continuous supply to its customers.

The number of customers served is between 120,128 (Finance Director's records) and 152,000 (Director of Works). Non-functioning meters are reported to be 10,000 (Finance Director) to 20,000 (Director of Works). Average age of consumer meters is over 20 years and there are still meters registering in gallons which must be more than 40 years old. Non revenue water is estimated to be 30% to 35% (technical and commercial).

Sewerage is complicated by the topography. The collection system includes 18 lift stations whilst treatment is carried out at seven locations in 10 sewage treatment plants (3 activated sludge plants, 5 biofiltration plants and 2 stabilisation pond systems). A number of the outfall sewers have collapsed and most streams carry quantities of raw sewage. The activated sludge plants are not functioning, the trickling filter plants are operating at much reduced capacity and the stabilisation ponds are still working. Bulawayo is fortunate that the sewerage system lies in the Gwayi catchment whilst its surface water sources are all in the Mzingwane catchment and so are not polluted by the flow of untreated sewage from the city.

The water and sewer account is not ring fenced. There are significant transfers to other accounts – in the first 6 months of 2011, water income was $6.9 million of which $3.6 million (52%) was spent on water provision and the balance was a contribution to other accounts. Tariffs are significantly higher than in other local

authorities in this study – the domestic tariff allows a free amount (in the high and density areas) then a rising block tariff from 75 cents to $1,50 per cubic metre. Income is significantly less than budgeted. Water income budgeted for 2011 is $39.3 million but water revenue in the first six months of 2011 was $6.9 million. Consumers are not paying because of problems with billing and World Vision will be supplying meter readers with data loggers to improve data capture.

There are a number of players supporting rehabilitation in Bulawayo, including a $10 million project being implemented by the NGO World Vision with funding from Australian Aid; $6 million from the Infrastructure Development Bank of Zimbabwe being invested in various schemes and a contribution from the South African Department of Trade and Industry to a master plan study. A twinning arrangement between Bulawayo and Durban in South Africa is providing support particularly in financial management and tariffs. Consultancy contracts have been awarded for the master plan study and for duplicating the pipeline from Insiza Dam. Works contracts have been awarded for rehabilitation of the raw water pump stations for one of the two pipelines from Ncema to Criterion and for aluminium sulphate dosing at Criterion. Tenders have been received for rehabilitation of the water treatment plants at Ncema and Criterion.

## A2.3 Chitungwiza

Chitungwiza is supplied with bulk treated water by Harare Water. The supply meter is broken but Harare Water is charging for 31 Ml/day. The bulk supply meter used to reflect 30 to 32 Ml/day which corroborates the amount charged for. Water put into supply is equivalent to 476 litre per connection per day which is by far the lowest amount of any of the local authorities in this study. Chitungwiza Town Council estimates the population to be 1,6 million people (equivalent to 23 persons per stand) and if this is correct, water availability before taking into account losses and non-domestic consumers is 19,5 litre per capita per day. This is extremely low for a piped supply. It is reported that areas close to the supply source receive water for most of the time, some areas have intermittent supply and some areas never receive water. The latter two areas will have to rely for some or all of the time on other sources of water such as boreholes with handpumps, shallow wells and surface water.

Harare Water throttle the supply from Friday 5 pm to Monday 5 pm. During this period, Chitungwiza Municipality tries to direct the supply to critical institutions including the hospital.

If water supply can be improved, it is likely that most of the people currently using alternative sources will revert to municipal supply because the alternative sources involve carrying water.

Losses are estimated at around 40%. A significant cause of non-revenue water is illegal unmetered connections. 60% of domestic meters are working. Collection ratio is 40%.

Chitungwiza estimate an unrestricted demand of 60 Ml/day. This is likely to be an under-estimate. If consumption per stand were similar to Kwekwe (which meets unrestricted demand), Chitungwiza would require 162 Ml/day.

It would be useful for a socio-economic survey to be carried out to assess the actual population and sources of water.

Chitungwiza is planning a massive housing development to the south. Planning has been done for 15,000 stands and land is available for another 30,000 stands. Before this development can be implemented, the water source must be augmented. It is unlikely that the required volume of water can be supplied by Harare Water and the obvious source would appear to be to build a dam on the Mupfure River upstream of Beatrice with a treatment plant and pipeline to Chitungwiza. This would be contingent on sufficient yield being available from the dam. In terms of distance and pumping costs due to elevation difference, supply from the Mupfure may be a more economical solution to relieve water shortage in the area supplied by Harare Water than the proposed Kunzwi Scheme.

Chitungwiza has its own sewage treatment works discharging into the Nyatsime River, a tributary of the Manyame. There are a biological nutrient removal (BNR) activated sludge plant rated 20 Ml/day and a hybrid anaerobic pond/trickling filter plant rated 16 Ml/day. Neither is functioning and raw sewage is discharging to the river and polluting the water source of Harare (and hence of Chitungwiza). Some rehabilitation of the BNR plant is proposed under funding from the African Water Facility and PSIP funding. The Japanese aid organisation JICA will be doing a master plan. Once the BNR plant has been rehabilitated, there will be an additional power cost to run the many aerators and pumps in the plant. This should not be over stated, as on the current tariff the monthly cost will be about $52,000 which equates to 94 cents per stand and which compares to the bulk water charges from Harare Water of $285,000 per month.

## A2.4 Mutare

Mutare is most fortunate that its supply is entirely by gravity. Sources are the Odzani and Smallbridge Dams on the Odzani River and the Pungwe River (which is a run-of river source). Raw water gravitates to the Odzani Water Treatment Works. Treated water gravitates to the Christmas Pass Reservoirs which command the entire city. Being derived from upland catchments, the raw water is of high quality and chemical consumption is a quarter of what it is elsewhere. No pumps are needed to deliver water although power outages impacted on use of backwashing machinery at the treatment plant. but the NGO Mercy Corps provision of a standby generator (as part of a rehabilitation of the plant) has resolved this. The amount of water that is supplied should be sufficient but not all of the population receives water because of: spillage from reservoirs due to failure of the control systems, losses in the network and deficiencies in pipe sizing in parts of the network.

Estimated population is 300,000 people. The treatment works is rated 63,7 Ml/day but is actually producing 75 Ml/day. This is equivalent to 2 196 litre per connection

per day. Industrial usage has fallen as most industry has closed down including Mutare Board and Paper (paper mill) and Cairns Foods (canning factory). There are 34,148 metered connections of which about 7,300 are reported not be working. Collection of invoiced revenue is less than 50% due to a culture of non-payment and poverty. A high portion of disconnected customers re-connect themselves.

The water account is not ring fenced although there are plans to do this once certain outstanding commitments are cleared. Most of the water tariff is below the 40 cent/cubic metre stipulated by the Ministry of Local Government.

Mutare are not aware of how much it needs to pay in debt service for the Pungwe Scheme although this scheme was completed in 2000 and there is a 10-year grace period on the loan.

A South African consultant has been working on a water and sanitation master plan and a draft of this was provided to ECA. Mutare are working to complete network reinforcement that was planned but not completed under the World Bank Urban 2 program. However, when this work is complete there will be a need for more investment in infrastructure.

Most sewage flows to Gimboki Sewage Treatment Works which was the first BNR activated sludge plant in Zimbabwe. Units 1 and 2 are not working and Unit 3 which was being built under the World Bank Urban 2 Program was not completed. Power costs will increase significantly when this works is rehabilitated, although calculation of power costs for Chitungwiza suggest that the cost per consumer is small. Gimboki is subject to load shedding by ZESA.

## A2.5 Kwekwe

Kwekwe is able to fully supply its customers with water. Its source is Sebakwe Dam on the Sebakwe River. Water is released down the river to Dutchmans Pool Dam from which it is abstracted into a treatment plant rated 90 Ml/day. Treated water is pumped to Kwekwe and to the nearby ZISCO steel mill with its town of Redcliff. Production is 60 Ml/day and after deducting water taken by ZISCO/Redcliff, water put into supply is 2,421 litre per connection per day. This includes both the water used by the large industries in Kwekwe and losses which are estimated at 40%. Sewer blockages are common and the treatment works are in need of rehabilitation.

Kwekwe's biggest single water customer is ZISCO, which is responsible for distributing water in Redcliff. The steel mill has not been working and the demand from ZISCO/Redcliff has been low, which has left Kwekwe with surplus capacity. Hence all consumers do receive water. The steel mill has been taken over by an Indian company that has big expansion plans. When these come to fruition, Kwekwe's ability to supply its customers will be challenged. ZISCO has not being paying for water for some time, and owes Kwekwe municipality $7-$8 million.

Water tariffs are set in Kwekwe by the municipality, after extensive consultations and the forging of a consensus amongst consumers. The process starts with the City Budget Committee, which is headed by someone from commerce or industry in the city. Ward budget committees are involved in the initial discussions, which result in

a tariff proposal being formulated. This is put to a Rates Meeting, and has to receive formal approval from the Council. The tariffs are then implemented without further reference to government, which can only intervene if the tariffs can reasonably be said to be against the interests of consumers. Kwekwe obviates this by ensuring that there is full prior approval by the people.

Like many other urban local authorities, Kwekwe did not receive any central government subventions in 2010 and did not budget for any in 2011. Central government money is to be for investment purposes only (PSIP) – in practice the amounts allocated in the national budget for Kwekwe in 2010 and 2011 have not been made available to the city. The city would like to be able to borrow to finance its investment requirements and sets tariffs with a view to securing its credit rating.

Kwekwe provides a good example of the neglect of repairs and maintenance. In 2010, $1.8 m was budgeted for repairs and maintenance (all assets – not just W&S infrastructure, but probably predominantly W&S), while the out-turn (actual expenditure) was only $0.3 m.

## A2.6 Masvingo

The source of supply for Masvingo is from the largest dam within Zimbabwe, Lake Mutirikwe, which is shared with irrigation users in the lowveldt. Except in extreme drought there is no resource constraint. Water is pumped to the Bushmills Water Treatment Works and treated water is pumped to a reservoir complex to the south of the city which commands the entire city. Water has to be pumped over considerable distances and electricity costs are a concern. Current production is 24,000 cubic metres per day. As water is supplied for only 12 hours per day, the municipality assumes that unconstrained demand would be twice current levels. However, consideration of realistic consumption levels by different categories of customer suggests that unconstrained demand is likely to be much less than 48,000 cubic metres per day, while losses are likely to be higher than the 33% currently assumed. The city expects industrial usage and population to grow rapidly. It will be necessary to reduce losses and to increase supply capacity.

Raw water pumping and treatment capacity is 30 Ml/day and the constraint on water delivery is treated water pipeline capacity. Another pipeline is being installed. Most of the population uses municipal water as Masvingo has had a policy of not allowing domestic boreholes. Current production is equivalent to 1 684 litre per connection per day.

Maintenance has been on a breakdown basis for 10 years and there is a big backlog in planned maintenance. This applies also to the sewerage sector, where the two treatment works are operating but at reduced capacity. UNICEF is supporting rehabilitation of the water treatment works and of part of the sewage treatment works. Some of the maintenance backlog will be addressed through the African Development Bank project which envisages $1.5 million being spent on water (refurbishment of pumping equipment, transmission main, replacement of valves, meters etc) and a further $1.3 million on sewerage works (most of this being on sewer network rehabilitation).

The biggest problem on the financial side is unpaid bills. The proportion of billed revenue that is presently collected is only 50%, government institutions being the biggest culprits. As of mid 2011, Government owed around $2 million. Even though tariffs are known to fall short of covering all costs of providing water and sewage services, and revenue collections are low, the water account is nonetheless used to finance other municipal services. The benefits of ring-fencing W&S in providing more of a business orientation in the provision of these services is acknowledged, but the municipality notes that there would first have to be the political will to raise rates to levels sufficient to cover the costs of other services.

## A2.7 Chegutu

Chegutu's main source of supply is the Clifton Off-River Storage Dam which is filled from Poole Dam on the Mupfure River when the river is running. Raw water is pumped 15 km from Clifton to a water treatment plant on the eastern edge of the town. A pump station on the river close to the treatment plant is operated when the river is flowing. Treated water is pumped to reservoirs within the town.

Water supply is severely constrained by power availability but this is expected to be relieved in September 2011 when uninterruptible supply should be provided at a cost of $355,000 using funding from the Public Sector Investment Program (PSIP). Nominal water production capacity (once uninterruptible power is available) is 12 Ml/day (it is believed that the plant can be run at a higher throughput). This is equivalent to 992 litre per connection per day. Estimated unrestricted demand is 25 Ml/day. Approximately 90% of consumers do not have working meters. Losses are estimated as being over 50% with galvanised mild steel connection pipes being responsible for a significant portion of leakage.

There is a proposed development of 3,600 high density and 2,000 low density houses. Stands have been planned and pegged and investors want to develop them. It will not be possible to provide this development with water unless production capacity is expanded.

The water tariff is capped at 40 cents/cubic metre under an instruction from the Ministry of Local Government and Urban Development.

In two months when there was more power availability and hence higher water production, receipts from customers improved by a factor of two. This indicates that consumers are willing to pay for water if it is provided.

Funding is expected from the Zimfund administered by the African Development Bank. This will be used to rehabilitate the water network.

# A3 African Development Bank Project Summary

| | | | | | |
|---|---|---|---|---|---|
| I. | **Rehabilitation Cost Summary** | | | | |
| A. | **City of Harare** | | | **B. Mutare** | |
| | a)Water Supply | 4,925,000 | | a)Water Supply | 3,230,000 |
| | b) Sewerage | 4,600,000 | | b) Sewerage | 2,330,000 |
| | **Sub-total** | **9,525,000** | | **Sub-total** | **5,560,000** |
| C | **Masvingo** | | F | **Kwekwe** | |
| | a)Water Supply | 1,460,000 | | a)Water Supply | 1,520,000 |
| | b) Sewerage | 1,332,000 | | b) Sewerage | 2,080,000 |
| | **Sub-total** | **2792000** | | **Sub-total** | **3600000** |
| D | **Chegutu** | | E | **Chitungwiza** | |
| | a)Water Supply | 820,000 | | | |
| | b) Sewerage | 1,130,000 | | Swerage | 1,430,000 |
| | **Sub-total** | **1950000** | | | |
| | **Subtotal Rehabilitation Works** | | | | **24,857,000** |
| II. | Sanitation & Hygiene Education | | | | 300,000 |
| III. | Institutional/Capacity Building technical assistance services | | | | 538,280.00 |
| | Capacity Building goods | | | | 500,000.00 |
| | Medium to Long term investment plan study | | | | 522,480 |
| | **Subtotal** | | | | **1,560,760** |
| IV. | Study, engineering design and supervision services | | | | 2,091,620.00 |
| | Project management services cost | | | | 756,200.00 |
| | Steering Committee Operation Cost | | | | 25,000.00 |
| | Project Audit Services | | | | 60,000 |
| | Subtotal | | | | **2,932,820** |
| | **Grand Total Zim-Fund** | | | | **29,650,580** |

Source: ADB Project Appraisal Report *Zimbabwe Urgent Water Supply and Sanitation Rehabilitation Project, October 2010*