CWIS SAP

A TOOL TO SUPPORT INCLUSIVE SANITATION

LEARNING BRIEF SERIES

REGULATORY USE CASES

LEARNING BRIEF #2
August 2020

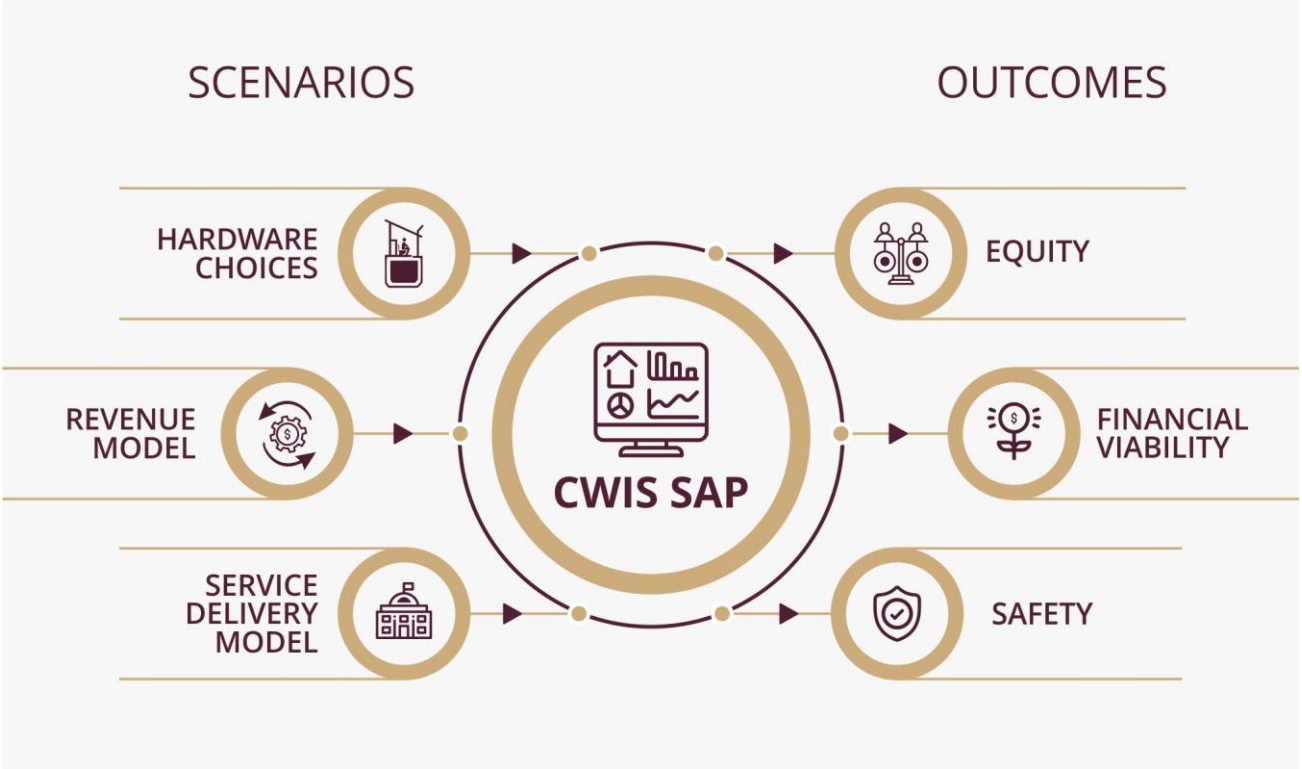
ATHENA INFONOMICS | ESAWAS REGULATORS ASSOCIATION | AGUA CONSULT | WASREB Water Services Regulatory Board | NAWASSCO Enriching Life | BILL & MELINDA GATES foundation

DIRK SCHAEFER | RICHARD CHERUIYOT | IVY AKUMU | GOUFRANE MANSOUR

INTRODUCTION

ABOUT CWIS SAP

The Citywide Inclusive Sanitation Services Assessment and Planning (CWIS SAP) tool is a software tool to help decision-makers compare the outcomes of different sanitation interventions or investments based on criteria of equity, financial sustainability and safety of sanitation services. In 2019-2020, the Water Services Regulatory Board (WASREB) and Nakuru Water Supply and Sanitation Company (NAWASSCO) in Kenya and the National Water Supply and Sanitation Council (NWASCO) and Lusaka Water and Sanitation Company (LWSC) in Zambia piloted the tool.



The tool starts with a mapping of current city-level sanitation coverage and the costs to provide services, revenues and safety levels associated with each of the sanitation systems in use. It then allows the user to model up to three scenarios that consider changes to hardware, alternative revenue and service delivery models, or any mix of those interventions. Using data provided by utilities and regulators, the tool compares the outcomes of each scenario on:

- **Equity**, with indicators on coverage rates for different income groups, how public funds are targeted, and affordability for service users;
- **Financial sustainability**, measured by the cost coverage ratio and the net income of service providers; and
- **Safety**, defined as the percentage of waste safely managed.

The tool results allow decision-makers to weigh the trade-offs between different options and assess which intervention best meets their objectives. The CWIS SAP tool is intended to support utilities, regulators, and other stakeholders including ministries, local governments, and development finance

institutions to make informed decisions about how to prioritize limited resources for new investments in sanitation, structure tariffs, and design business models to deliver inclusive sanitation services. The process of gathering the data the tool requires can also provide a framework for identifying data points necessary to analyze sewered and non-sewered services and guide utilities and regulators to strengthen data collection and management.

ABOUT THIS LEARNING BRIEF

This learning brief is part of a series produced to document the piloting of CWIS SAP in Nakuru and Lusaka. This piloting was carried out by regulators and local utilities, with technical assistance from Athena Infonomics, Aguaconsult and the Eastern and Southern Africa Water and Sanitation Regulators Association (ESAWAS).

This brief explores regulatory use cases for CWIS SAP and illustrates how the tool can be applied to support regulatory processes for sanitation services.[1] Increasingly, regulators have a mandate to request utilities to venture into new areas like non-sewered sanitation service provision so as to achieve the country's policy objectives related to inclusive sanitation. In doing so, regulators also prescribe standards when regulated utilities submit information as part of their regular performance reporting, application for tariff adjustments or any other reporting requirements the regulator might deem necessary. To date, however, regulatory functions are constrained by a lack of data, especially on the costs of sanitation services. This represents a challenge to regulators in executing their role of balancing stakeholder interest with respect to quality of service, financial and service sustainability.

CWIS SAP offers the potential to fill this gap by providing a standardised framework for collecting, analysing and reporting on data related to sanitation (both sewered and non-sewered). This brief starts by presenting the regulatory processes that can be implemented to promote equitable sanitation. In doing so, it highlights specific processes that can be enhanced by applying CWIS SAP, including disaggregating costs, identifying subsidies, allocating investment resources, and designing sanitation levies, using the sector context in Kenya and Zambia. The brief then explores how CWIS SAP can support these processes.

REGULATORY PROCESSES TO PROMOTE EQUITABLE ACCESS TO SANITATION

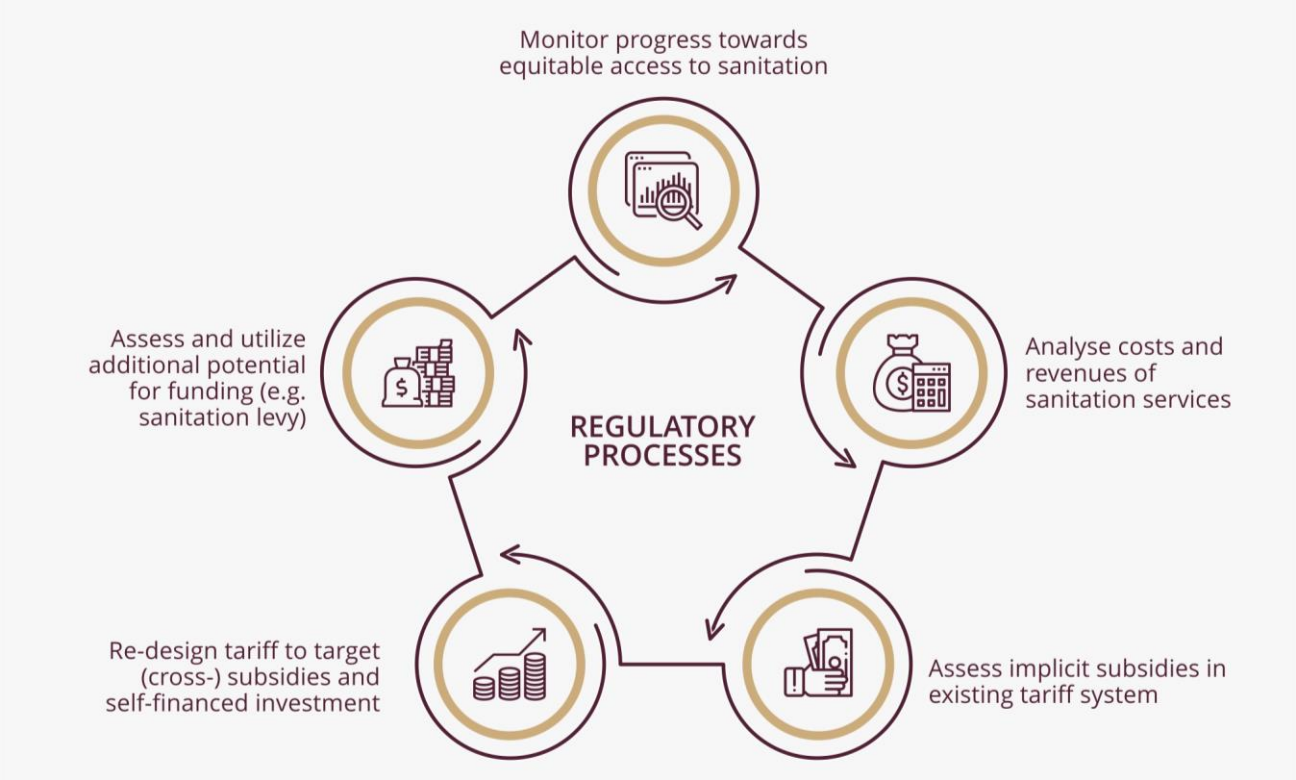
To promote equitable sanitation, regulators can develop and apply a range of instruments and processes. Where sanitation services are being provided by regulated utilities, such regulatory processes would typically involve incentives and sanctions and centre around tariffs and investments, including elements of cross-subsidies and enhancing utilities ability to generate or to access funding for investment. For this, as for almost any regulatory process, reliable and accurate data is key.

Figure 1 illustrates a typical sequence of regulatory processes starting with an analysis of the status quo, in this case on equitable access to sanitation. Where this is a national policy objective, a regulator can

[1] In the context of this paper "regulator" or "regulatory procedures" refers to regulatory authorities responsible for regulating water and sanitation service provision through licensed and regulated service providers, i.e. predominantly utilities.

play a key role in facilitating increased access to sanitation by creating an enabling environment for service providers. In the scenario below, a regulator assesses the costs and revenues of sanitation service provision and compares those with the existing tariffs to assess whether there are implicit cross-subsidies. This information can then be used to re-design the tariff for better targeting of subsidies and self-financed investments (i.e. those financed using tariffs revenues). Where instruments for additional funding exist and for which the regulator needs to grant approval, e.g. a sanitation levy or surcharge, such regulatory approval can be based on the analysis and decisions made in previous steps. It should also consider remaining funding gaps to achieve specific goals for increasing access to sanitation services.

Figure 1: Regulatory processes to promote equitable access to sanitation



Each of these steps requires data on costs of different types of sanitation services. Each single step can benefit from the data collected for CWIS SAP. How CWIS SAP can support these steps is highlighted in four use cases for CWIS SAP, which are further detailed below:

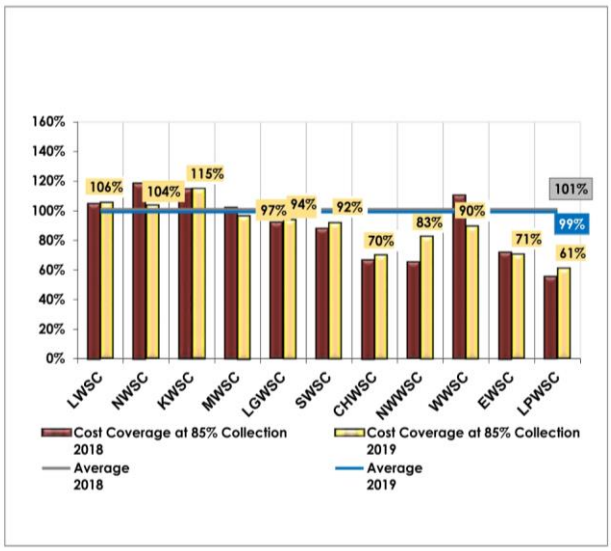
- Disaggregating costs;
- Making subsidies explicit;
- Supporting the allocation of small investments; and
- Designing a sanitation levy.

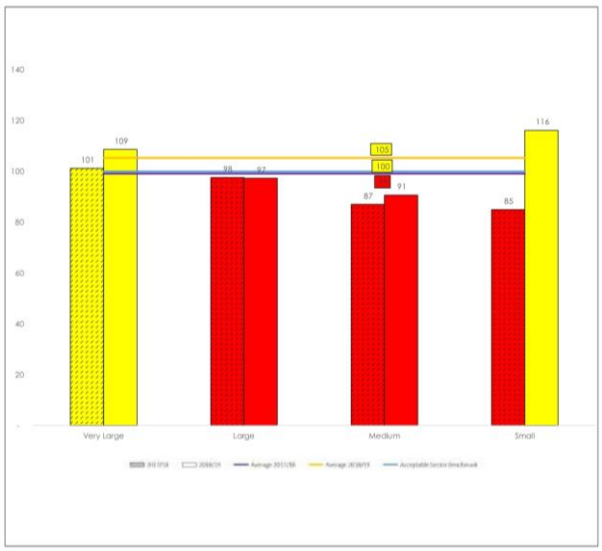
DISAGGREGATION OF COSTS OF WATER AND WASTEWATER SERVICES

STATUS QUO ON COST SEPARATION AND SANITATION TARIFFS

The ESAWAS regulators have gained significant experience in regulating tariffs for water or combined tariffs for water and wastewater services since their establishment 10 to 20 years ago. Until today, most regulated utilities in the region only provide water services, and the few that provide sewerage services do so to a very limited extent. After several rounds of tariff approvals for water and sanitation utilities in their respective countries, regulators have developed an improved understanding of the justifiable costs of water service provision, cost drivers and potential for efficiency improvements. This is the case, even though the policy objective of full-cost coverage or even just O&M cost coverage has not yet been achieved across the board in most countries (Figure 2).

Figure 2: Utility O&M cost recovery in Zambia and Kenya





Utility O&M cost recovery in Zambia[2]

Utility O&M cost recovery in Kenya[3]

Tariff approvals are often linked to conditions which might include goals that could reduce future needs for tariff increases, e.g. reducing non-revenue water, improving collection efficiency, increasing the customer base etc. In general, average tariffs the region may need to be increased significantly to achieve the goal of full cost-recovery. Nonetheless, such efficiency gains could contribute to keeping required tariffs at a lower level.

Until recently, most of the ESAWAS regulators as well as the utilities they licensed largely limited their engagement in sanitation services to sewered sanitation, even though only a fraction of their populations benefit from such services. This was at least partly caused by a lack of clarity on responsibilities for policy making and service delivery for non-sewered sanitation services. Sewerage services, tariffs and charges set by regulators are not based on an analysis of the actual costs of services

[2] National Water Supply and Sanitation Council (2018): Urban and Peri-Urban Water Supply and Sanitation Sector Report 2017

[3] Water Services Regulatory Board (2019): Impact – A Performance Report of Kenya's Water Services Sector 2017/2018

provision. There have been limited efforts to understand the operating expenditure (OPEX) and capital expenditure (CAPEX) requirements of sanitation service provision as a whole.

In the absence of reliable information on costs of sanitation services, most regulators adopted an overall water and sewerage tariff model in which utilities charge customers with a sewer connection a percentage on the water bill as part of their monthly bill. In Kenya for instance, utilities charge domestic customers with a sewer connection an additional sewerage fee ranging from 50% to 100% of the monthly water bill, whereby sewerage volumes for customers with a water connection are determined at 75% of the volume of water consumed.[4] Commercial and industrial customers are charged a tariff based on 100% of their water bill. In Zambia the sewerage surcharge typically ranges from 20% to 40% for domestic customers while commercial customers generally pay between 20 to 45%. To get connected to a sewer line, domestic customers in Kenya pay approx. USD 50, while customers in Zambia are expected to pay for at least 12m of pipe and associated fittings.

For non-sewered sanitation, exhauster services are also regulated in both countries if they are provided by a licensed utility.In Zambia prices differ between utilities and range from approx. USD 27 to 50 per trip .[5] In the Kenyan Cities Nairobi[6] and Mombasa[7], the rate is set to approx. USD 50 for all customers in non-low-income areas while customers in low-income areas pay approx. USD 40. As mentioned, such tariffs and charges for sewerage or exhauster services are not based on a comprehensive analysis of the actual costs involved in those services. They are set in combination with the water tariffs at a level that aims to recover at least the O&M costs of the utility.

Until 2019, both in Kenya and Zambia, the regulatory reporting did not require or allow utilities to report their costs for water and sewerage service provision separately. Utilities were only required to report some operational data on sewerage services (e.g. volume of treated wastewater including volumes imported or exported, effluent quality compliance, number of sewer connections). The nature of water and sanitation utilities operations imply that reporting these costs separately is not a straightforward process as they share common overhead costs. While some staff at water production or wastewater treatment plants could be clearly and exclusively allocated to water or sanitation services, the same does not apply for most of the staff in other operational, administration and finance departments. In 2020, NWASCO in Zambia introduced regulatory requirements to separate the costs, while WASREB is beginning to do so for some utilities.

HOW COULD CWIS SAP SUPPORT THE SEPARATION OF COSTS?

WASREB recently piloted with selected utilities the reporting of disaggregated costs for water and sewerage services as part of their tariff application. As a result of this pilot, WASREB shifted to a revised tariff structure, where sewerage customers will have to pay a specific volumetric wastewater tariff for 80% of the water consumed. WASREB will introduce mandatory cost disaggregation in tariff applications of the very large and large utilities in Kenya (categories defined by WASREB based on the number of customers). This disaggregation is focussed, to date, on sewered services only. However, WASREB

[4] It is common for regulators internationally to assume that not all water consumed by household eventually ends up as wastewater in the sewer network.

[5] National Water Supply and Sanitation Council (2019): Water Supply and Sewerage Tariffs 2019

[6] https://www.nairobiwater.co.ke/index.php/en/watertariffs

[7] https://www.mombasawater.co.ke/index.php/customer-care/water-and-other-services-tariffs

intends to introduce a requirement for cost data for non-sewered sanitation services as well, when these are provided by regulated utilities.

The CWIS SAP tool can support the development of this regulatory requirement by providing a data framework. The tool's financial model includes cost structures for operation and investment in sanitation, for both sewered and non-sewered services. These cost structures can provide guidance to a regulator on data disaggregation (what cost categories should be taken into account) and data availability. The structures and terminology used by CWIS SAP and the regulatory information systems should ideally be aligned as much as possible.

Box 1: CWIS SAP Data Requirements

The CWIS SAP tool requires substantial data on the share of households using each type of sanitation services modeled and the costs and revenues associated with each service. For example, to accurately calculate the costs of operating a vacuum truck, the tool requires data on a truck's labor costs, fuel, and maintenance, as wells any licensing costs or tipping fees the truck owner can expect to pay. To calculate revenues, the tool uses the share of pit latrines/septic tanks emptied by vacuum truck, their average volume, and the frequency of emptying to determine how many trips a vacuum truck would make, and then multiplies by the price charged per trip.

Although this approach means the tool requires a large number of granular data points, it allows users to identify specific drivers of costs and explore how changes to individual data points affect the overall results. In many cases, users will not have all of the required data readily available. The data may need to be gathered from multiple sources, and some data points may need to be newly collected or estimated by the users.

During the pilots in Lusaka and Nakuru, the utilities and regulators initially addressed data gaps by making estimates, but also used the data requirement to help guide data collection activities that took place during the project. As utilities and regulators strengthen their data systems for sanitation, using the tool to consolidate a city's data, systematically identify data gaps, and guide priorities for future data collection can support other processes in addition to the use of the CWIS SAP tool. The quality of the tool results can also be expected to improve over time as users collect new data.

Figure 3: Example of CWIS SAP data requirements for vacuum truck costs

CAPEX - Vacuum Truck	
Cost of Vacuum Truck and **Useful Life**	Per unit
OPEX - Vacuum Truck	
Labour Cost	Per Truck
Cost of Equipment	Per Truck
Fuel Costs for Vacuum Truck	Per Trip
Licensing Fees for Trucks	Per Truck
Regular Maintenance Cost for Vacuum Truck	Per Truck
Tipping Fees	Per Truck [10 Year Horizon]
Annual Leasing Cost of Vacuum Truck (Utility)	Per Truck
Utility Overheads	Proportion of Direct Costs
Loan Information	

Loan Amount for Vacuum Truck	Amount
Loan Tenor for Vacuum Truck	Years
Interest Rate for Vacuum Truck	Percentage
Repayment Start Date	Year
Grant Information	
Grant for Capital Requirements	Amount
Grant Recognition Period	No. of Years
Grant Start Period	Year

Embedding CWIS SAP costs structures within regulatory processes implies that regulators like WASREB will need to consider amending their regulatory information systems (e.g. WARIS in Kenya, NIS in Zambia or MajIs in Tanzania) so that utilities disaggregate the data they report according to the services they provide. While CWIS SAP itself might not become part of this routine reporting, CWIS SAP cost categories and methodology can provide some consistency in content, structure, and terminology. Aligning the structures and terminologies of CWIS SAP and the regulatory reporting requirements would increase the possibility of data transfer between and improve the compatibility of CWIS SAP and other information systems.

UNDERSTANDING INTENDED AND UNINTENDED SUBSIDIES IN EXISTING TARIFF REGIMES

STATUS QUO ON SUBSIDIES

Bundling the costs of sanitation services and water services together, without disaggregation, is likely to result in cross-subsidies between these services. In the interests of equity and transparency, the costs of each service should be assessed separately, and all subsidies should be made explicit.

Utilities in Kenya, Zambia and other countries charge customers with a sewer connection a tariff that includes provision for wastewater treatment. The absence of any reliable analysis of the costs of providing those sewerage services, however, means that the tariff charged does not reflect the actual costs, neither at the level of an individual connection nor at the level of the utility. It is therefore unclear, whether the 50% to 100% surcharge on a household's water bill in Kenya, for instance, is below or above the actual costs of providing these services. Considering that many of the existing wastewater or sludge treatment plants are not operated adequately or are dysfunctional, even separating the current O&M costs of a utility might not give an accurate picture of the costs of operating and maintaining sewered or non-sewered services.[8] The same applies to the costs households must pay to get connected to an existing sewer line.

If the actual costs for the utility turn out to be lower than what is currently charged to customers with a sewer connection, those sewered customers would be subsidising those who only use water services. These would be implicit and potentially unintended cross-subsidies flowing from sewerage to water services. In most cities with significantly less than 100% sewerage coverage, those who are connected to

[8] It is against this background that some regulators, like WASREB, increasingly scrutinize the budgets of service providers for provisions for maintenance and set minimum thresholds (e.g. 8% of O&M costs in Kenya).

a sewer are more likely to be higher income households and such subsidies could potentially be intended politically to benefit lower income customers. However, where the real costs of sanitation services are not known, such cross-subsidies cannot be measured and cannot be managed adequately from a regulatory perspective.

On the other hand, where the actual costs the utility incurs in providing a sewered service are higher than the tariff charged, then customers with only a water connection are subsidizing those with both a water and a sewerage connection. This is likely to benefit wealthier customers. Poor customers are not necessarily subsidizing rich customers if they benefit from poverty-oriented cross-subsidies like lifeline tariffs, rising block tariffs and social tariffs at water kiosks. But subsidies flowing from the more widely available water services to the few who are connected to sewer lines would at least constrain the positive effects of those explicit and intended cross-subsidies.

HOW COULD CWIS SAP SUPPORT A BETTER UNDERSTANDING AND DESIGN OF (CROSS-) SUBSIDIES?

When combined with the regulator's requirements to report disaggregated data on water and sanitation services, CWIS SAP can enable utilities to establish the costs of sanitation services. This could inform a robust review of all current sanitation tariffs. It could also help to establish whether current tariffs for installing a sewer connection or providing sewered or non-sewered services are cost-reflective, or charge above or below this level. This analysis could would make explicit which customers are benefiting from existing cross-subsidies within the system or public subsidies, e.g. for sewer connections, and whether these subsidies are in line with the country's policy objectives.

In addition, the CWIS SAP tool's scenario modelling function allows users to model different external subsidy and internal cross-subsidy options. Subsidies can be modelled both for access to and payment for services, whether sewered or non-sewered. While this modelling might have to be an iterative process, the tool addresses a significant gap, as the sector so far largely lacks tools that support the design of (cross-)subsidies and that can help to make them transparent for decision makers and customers. Applying a transparent approach to subsidies could help to improve their pro-poor orientation.

USING TARIFF SETTING TO INCENTIVIZE UNBIASED INVESTMENTS IN SANITATION

STATUS QUO TARIFFS AND SELF-FINANCED INVESTMENTS IN SANITATION

The tariff approval process of many regulators makes provision for utilities to finance modest investments from tariff revenue. Regulators do not necessarily advise on or prescribe to utilities what kind of investments they should propose under this provision. As the approval of such investments leads to increased tariffs (to cover the costs of these investments), utilities are generally required to account for those revenues and their use separately.

In Kenya, utilities who intend to make use of this provision must justify in their tariff application, which investments they intend to finance and why. WASREB has the power to approve or ~~to~~ reject such

applications. Details of the approved investments financed from tariff revenues form part of the information published in *The Kenya Gazette* upon tariff approval. Investments that can be financed from tariff revenues can be quite substantial. In the case of Nakuru Water and Sanitation Services Company, for example, the annual investment budget approved by WASREB amounts to approx. USD 1 million.

In principle, in addition to financing water supply related measures, utilities can use this provision for sanitation investments, e.g. to procure exhauster trucks for emptying septic tanks, to expand the sewer networks or to subsidize household sewer connections. In practice, however, no utility has yet approached WASREB with a proposal to invest into the provision of non-sewered sanitation services in low-income areas, e.g. for the procurement of mobile desludging units, household subsidies for investments into containment or the construction of sludge treatment facilities.

HOW COULD CWIS SAP PROVIDE SUPPORT IN GUIDING SELF-FINANCED INVESTMENTS IN SANITATION?

Once populated with data, CWIS SAP provides utilities and regulators with a detailed costing of potential sanitation interventions and can therefore support utilities in formulating investment proposals. Increasingly, utilities, regulators and policymakers are recognising the importance of investing in non-sewered sanitation. For example, in its National Water Supply and Sanitation Strategy 2019 to 2030, the Government of Kenya has adjusted its target of achieving 80% sewerage coverage in urban areas by 2030 to a combination of 40% sewered and 40% non-sewered sanitation. But efforts are constrained by a lack of data on the costs involved as most utilities are only starting to engage in non-sewered sanitation activities. In addition, CWIS SAP provides utilities with a cost comparison between different investment scenarios (e.g. investing in sewers vs. investing in non-sewer infrastructure). Regulators like WASREB could therefore request utilities to demonstrate in their upcoming tariff applications that they have considered various scenarios for sewered and non-sewered sanitation (using CWIS SAP) and are using the results as basis for their tariff application and inform their investment proposals.

DESIGN AND ADVOCATE THE SANITATION LEVY

STATUS QUO ON THE SANITATION LEVY

An increasing number of countries have in recent years introduced the idea of a sewerage or sanitation services "levy" or "surcharge". The Water Act 2016 in Kenya for instance mandates the regulator to impose a sewerage services levy on all water bills, to improve and extend sanitation services.[9] While the formulation in the Act speaks explicitly of "sewerage" services, it can be interpreted to apply also to decentralized or non-sewered service In addition, since the Water Act has come into effect, the name of the Ministry has changed to include "sanitation" and the political environment for supporting non-sewered sanitation has changed significantly as a result. In Kenya, utilities are beginning to change their names from "water and sewerage provider" to "water and sanitation provider". Other countries, including Zambia, have similar provisions in their legal or regulatory framework with the regulator changing the license for all utilities to include provision of non-sewered sanitation services.

[9] The Water Act 2016, Art. 109 (1) and (2) - https://wasreb.go.ke/downloads/Water%20Act%202016.pdf

Consequently, all utilities in Zambia are rebranding from "water and sewerage providers" to "water and sanitation providers".

The potential of sanitation levies to develop and extend sanitation is not currently used to optimal effect, in part because of limited understanding of the costs of sanitation services. More importantly, however, many stakeholders are wary of introducing additional levies and the potential negative response from customers. Productive discussion of wider potential use of the levy requires transparency and a credible explanation of the impact the levy would have and how any misuse could be avoided. This discussion has to be held by individual utilities together with their shareholders, their customers and the regulator. The regulator itself should, in addition, provide general guidance and support utilities in their discussions at local level if they face resistance from politicians, customers or other stakeholders.

HOW COULD CWIS SAP HELP TO INFORM THE APPLICATION OF THE SANITATION LEVY?

CWIS SAP can enable key stakeholders, including the Water and Sanitation Ministries, regulators, local governments and utilities to assess the costs of increasing access to and providing sewered and non-sewered sanitation services, for both the utilities and their customers.

While the introduction of additional levies might always be controversial, the information generated by using CWIS SAP can be used to discuss the sanitation levy based on actual data on costs and who bears those costs. Running scenarios based on the potential revenue from the levy could help convince stakeholders that the revenues generated would be used in the most sensible way towards achieving the most relevant policy goals or other local priority considerations. Comparing the scenarios could give decision makers the comfort of having a choice and taking an informed decision they could defend in front of their constituents. The visualization element of CWIS SAP could be useful for advocating a specific use of the sanitation levy.

CONCLUSION

Regulatory authorities in Eastern and Southern Africa are increasingly taking an active role in regulating the provision of both sewered and non-sewered sanitation services. As regulators evaluate utilities' plans to mobilize and use resources to extend sanitation services, data will be critical. The CWIS SAP tool can support regulators in disaggregating and analysing the costs, revenues, and subsidies specific to sanitation services.

The CWIS SAP tool can only be one element of a broader effort to strengthen the regulation and delivery of sanitation services, however. The tool can provide a framework for understanding the costs of sanitation services but needs to be complemented by regular data collection and reporting on both sewered and non-sewered sanitation. The tool is also most effective in a context in which policy supports the consideration of both sewered and non-sewered options. As utilities work to implement new mandates to deliver onsite services, regulators have an important role to play in requiring utilities to evaluate multiple intervention options and identifying those that best serve policy goals.