Water Supply & Sanitation Working Notes

FINANCING WATER SUPPLY AND SANITATION INVESTMENTS

ESTIMATING REVENUE REQUIREMENTS AND FINANCIAL SUSTAINABILITY

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Disclaimer

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1   INTRODUCTION

This paper examines the applicability of conventional formulas that have been widely used in the water supply and sanitation sector to determine revenue requirements for average tariffs. It discusses the impact of capitalization issues on revenue requirements, particularly focusing on the lack of long-term financing for water investments in developing countries. Given the resistance among policy makers to increase water tariffs, the paper also highlights the impact that intangibles or implicit charges have on undermining utilities' financial situation and how such intangibles can be incorporated in the revenue requirement formula to ease the shocks that may arise as a result of uncontrollable external factors. Finally, the paper introduces the concept of "appropriate costs," which can guide practitioners into carrying out performance audits of publicly owned utilities in order to assess which tariff level is actually appropriate for users to bear and which should be shouldered by other parties.

This paper is mainly intended for public utilities that are experiencing difficulties in meeting their financial commitments because of insufficient operating revenues and capital financing. The capital programs of these utilities would be financed predominantly by budgetary transfers or through subordinated debt from central or local governments that have not yet established a lending relationship with private lenders. Some of the issues may also pertain to privately run and financed utilities particularly on issues of contingent or implicit costs related to unexpected macro shocks.

2   FINANCIAL SUSTAINABILITY: A MATTER OF RELIABLE SOURCES OF FINANCING

Financial sustainability of water supply and sanitation investments and operations are often cited as essential determinants for ensuring the provision of safe, reliable drinking water. Yet the concept of financial sustainability and how it translates into estimates for revenue requirements are frequently misunderstood. The reason is that financial sustainability can take on different levels, particularly if one makes a distinction between a short- and a long-term horizon.

In the simplest case, a utility that meets its daily cash needs for operations and maintenance (O&M) and for minor capital outlays could be viewed as financially sustainable in the short run. This could be so even if a large part of those cash needs are sourced through external governmental transfers. What matters to the financial equation in this case is the predictability of the financing source, rather than the source itself; as it has been demonstrated that in many parts of the developed world, utilities can be financially sustained through the long term with direct capital and operating subsidies paid largely by taxpayers.

For many developing countries, the lack of predictability—or, say, the reliability of subsidies and other external financing—is a principal constraint in sustaining water utilities financially. This is particularly true if the utilities rely on such transfers in order to meet their ongoing cost of operations. Governments with many pressing and competing commitments for budgetary transfers cannot be relied on entirely to financially support water utility operations, let alone capital investments needs. Funding may be available, but more often on a sporadic or nonrecurring basis. On global basis, donor aid grants funds are also relatively limited, as are other public sources of financing such as loan facilities from international financial institutions. Often, these are rationed to accommodate a number of competing needs across different sectors and purposes. Overreliance on these sources thus means reducing the

Table 1 Levels of Financial Sustainability

Creditworthy	Country conditions and Developed financial markets
Marginally creditworthy	Reliable refinancing sources and security for the loan
Sustainable cost recovery	Anticipates long-term costs' impacts
Cost recovery	Profitable in any given year but not sustainable in the long term
Pay-as-you-go recovery of cash needs	Capital subsidies
Unviable loss-making utilities	Capital and operational subsidies

Source: Author's elaboration.

predictability of financing for any given investment, and hence lowering the opportunity to achieve financial sustainability in the long term.[1]

A utility can meet a high financial sustainability threshold through a fundamentally secure and predictable source of funding that can, not only meet ongoing cash commitments but, also anticipate sudden cost increases and expansion requirements. Reaching this level, however, requires the utility to become creditworthy and the banking sector and local capital markets to become well established as depicted in table 1.

The dilemma for policy makers is that this upward movement also has a direct commensurate impact on user tariff levels. The shift from subsidies to user charges and from donor grants and concessional loans to more commercial financing terms increases the amount that consumers are expected to pay through user tariffs.

Moreover, moving upward in the "sustainability" levels also means paying more attention to intangibles, which can also undermine a financial condition in the immediate and longer terms. Postponing scheduled maintenance, for example, will reduce tariffs in the short term by postponing financing needs to a later date. This may be a reasonable trade-off business strategy if utilities could count on financing sources in the future to meet these deferred needs. But again, in many cases they cannot because local capital markets in developing countries are thin and public funds may just not be available when the financing is needed as a last measure. Similarly, failure to make provision for expected cash shortfalls arising from, say, bad debts or local currency devaluations may place the utility in an untenable financial situation and again compromise its long-term viability.

So policy makers have a conscious trade-off to make—either adopt cost recovery guidelines for setting tariffs and move up the levels of financial sustainability, or keep the utility in the lower thresholds of financial sustainability and perpetually reliant on unpredictable sources of public sector financing. Fortunately, this process can involve a little of both to the extent that cost recovery tariffs can be implemented gradually and in a methodical way in order to respect consumer affordability issues and maintain the utility's financial sustainability in the short term. Under such circumstances, policy makers must be willing, however, to shore up financing gaps in the event of sudden shocks (such as increases in bad debts, production and O&M costs, devaluation, material adverse change in financial condition, and so on).

Given these considerations, achieving long-term financial sustainability for water utilities in developing countries should thus entail (a) lessening the dependence on governmental subsidy transfers, (b) increasing reliance on user tariffs as the main source of internally generated financing, and (c) gaining financial independence to source external private financing based on the enterprise's own creditworthiness. This effectively means moving up the various definitional thresholds of financial sustainability from "loss making enterprises" totally reliant on public subsidy support to "creditworthy" utilities capable of sourcing financing independently of banks and local capital markets.

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[1] To solve the problem of the predictability of funds, a number of instruments that can bridge the financing gap can be used. Among them, Output-Based Aid (OBA) agreements/contracts are arguably a means of increasing the certainty and predictability of these payments. For a discussion of OBA, see www.gpoba.org.

It should be acknowledged that movement toward financial independence is not purely a financial issue but also a political one, particularly because of the political interference confronted by most utilities when setting cost recovery tariffs.

3   THE INFANT UTILITY CHALLENGE

Owing to the uncertainty of accessing external sources of finance in the form of both equity and debt, the decision on whether to adopt cost recovery tariffs becomes increasingly relevant, particularly given the added growth challenge faced by utilities in developing countries.

In contrast to more mature utilities that operate in developed countries, many water utilities in the developing world exhibit low coverage, which translates into high growth and investment needs in relation to their existing asset base. The more mature utilities may have already reached or are close to reaching full coverage and thus require less expansion capital in proportion to their existing asset base. In some cases, the depreciation of existing capital can free up sufficient internally generated cash to finance the replacements needed.

This fundamental difference between these two stages of development, along with the challenges faced by infant utility sectors, is illustrated in table 2.

While a mature water sector typical of an industrialized nation that is already at 100 percent coverage can easily maintain this level of service with minimal new investment, an infant one needs to invest at a fairly high rate. For example, for a sector with 50 percent service coverage overall, full service coverage cannot be achieved in the near term even with high growth rates in the sector. The earliest would be about 6 years if a 15 percent growth rate could be sustained; and even at a respectable rate of 5 percent per year, it would take about 20 years. To achieve full coverage within a more desirable time frame of 10 years would require an annual growth rate of almost 10 percent per year.[2]

Table 2 illustrates the fundamental need for the infant utility to improve and invest continuously at a high rate to achieve full coverage, which may be problematic when resources to finance such investment are scarce and/or unreliable. For many developing countries the external finance problem is a dual one. On the one hand, debt markets lack depth and breadth, that is, there is a lack of affordable long-term financing and a limited number of instruments that could be deployed for meeting financing needs. On the other hand, "shareholder equity financing" for public utilities as opposed to subsidies are often misunderstood and may be scarce as well. In any expansion scenario typical in developing countries, shareholder equity financing provides a critical element to the

Table 2 Years Needed to Achieve Full Coverage under Different Growth Assumptions (Comparison between Infant versus More Mature Water Sectors)

Stage of water sector		Current coverage	Growth target rates for full coverage		
			5%	10%	15%
Infant		35%	30 years	13 years	8 years
		50%	20 years	9 years	6 years
Mature		75%	8 years	4 years	2 years
		100%	-- Less than one year --		

Source: Author's elaboration.

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[2] These figures are derived using a population growth of 1.3 percent and a population/connection ratio of 5.

financing equation in order to be able to leverage other external debt financing. Understanding of this basic principle by policy makers will contribute substantially toward resolving the catch-up problem that is experienced today by many water utilities.

So while there is much political resistance in maintaining tariffs at adequate levels, there is compelling evidence that tariff pricing must consider additional factors that are not normally given much thought in the developed world, such as the scarcity of financing overall, the expansion needs of the utility, and the developmental objectives and targets for achieving adequate service coverage. More important, utilities *must* be allowed to generate and retain sufficient funds from internal operations in order to leverage up other possible sources of external finance; and additional cash infusions may be needed. In essence, utilities charging less than cost recovery tariffs would not generate sufficient internal funds for such aims.

It should be noted that mature utilities may not be without problems. Some older cities in developing countries—for example Buenos Aires and Cairo—suffer from a "senile utility challenge." Many pipes, which the utilities may well have lost the records of, are aging and in need of replacement. When this occurs in an older city where the asset condition, remaining life, and exact location of the pipes may be unknown and replacement may require digging up roads and other structures, there can be waves of substantial replacement costs, resulting in cash flow problems. So although the cause is different, the results (cash flow problems) and the responses (the need for the utility to generate sufficient cash flows) can be quite similar.

4 CALCULATING REVENUE REQUIREMENTS

As a general rule, the revenue required by a utility in a defined period is determined by two essential cost components: O&M expenses and the capital component. On this basis, two main approaches have been practiced for estimating revenue requirements: the Cash Needs method and the Utility/Cost Recovery approach.

Each approach factors both O&M and capital elements but in different ways and to different degrees; consequently the approaches yield different revenue requirements and different average tariff levels.

The two formulas in their basic form are illustrated in table 3.

A major difference between one method and the other is how the capital component is factored into the calculation. Under the Utility/Cost Recovery approach, depreciation and the rate of return on invested capital provide the basis for the capital requirement, while the Cash Needs approach only considers explicit charges for the financing of capital, whether they are debt service on loans or capital expenditures made in the current year.

Policy makers face a dilemma as to which approach best meets their objectives for financial sustainability. Moreover, as indicated, the choice of one approach over the other has direct implications on user tariffs.

Table 3 Conventional Revenue Requirement Formulas for Water Utilities

Revenue requirements	=	Operating component	+	Capital component
Cash needs	=	O&M costs	+	Debt service
Utility/cost recovery	=	O&M costs	+	Depreciation + return on investment

Source: Author's elaboration.

The **Cash Needs method** derives user tariffs by recovering the utility's *explicit cash requirements,* which include outlays for O&M expenses and the repayment of debt used to finance capital expenditures. In other words, cash budget estimates are used as the basis for establishing user charges. While a project can be financed through equity contributions from external owners such as municipalities, neither equity nor any returns involve an explicit repayment schedule; therefore they do not constitute an explicit cash commitment that would be included in the Cash Needs formula.

In accounting terms, this approach takes the "cash flow statement" and cash accounting as its basis, meaning that it would not incorporate costs that are booked into the accounts but not paid out. In a simplified case, assuming no changes in working capital or tax and dividend payouts, the net cash outlays would consist of O&M and the debt service payments (including both interest and principal) if debt financing is mobilized.

In the Cash Needs formula government utilities at times also include certain capital items to be funded through current revenue. These capital items are normally referred to as "pay as you go" capital and generally include vehicles, motors, pumps, and water meters. Even though these are clearly capital items, they are included in the annual operating budget and they are treated in the same way as other annual cash expenses.

A utility can be financially sustainable when using a Cash Needs approach, although its growth prospects are curtailed by the fact that revenue requirements do not allow for additional cash generation beyond recovering O&M outlays and debt service. Also, when using this method the utility is more vulnerable to sudden shocks, such as a currency devaluation that may cause costs to rise sharply. So while tariffs can be set at a relatively low level using the Cash Needs approach, there is also greater risk of volatility.

The **Utility/Cost Recovery** method is the other widely used approach for determining revenue requirements for water utilities. In accounting terms, this approach takes the "Income Statement" and accrual accounting as its basis, meaning that the revenue requirement is calculated as the sum of the cost items (including non-cash items such as depreciation). In simple terms, assuming no taxes, the revenue requirement under the Cost Recovery approach includes O&M costs, depreciation, and the required return of total invested capital. The required return on investment, in other words, remunerates the debt and equity employed to finance the investment. Box 1 lists variants to cash needs and utility/cost recovery.

Box 1 Variants to Cash Needs and Utility/Cost Recovery

One variant of the Cash Needs approach is to include the net funding requirements for capital expenditure per the cash flow statements. In other words, a cash reserve fund (sinking fund) is established and annual contributions are incorporated into the revenue requirement formula in order to build up capital for a later investment requirement. This approach would derive a revenue requirement much closer to the one derived by the Cost Recovery formula.

A variant on the Utility/Cost Recovery approach is to use an annuity approach to estimate the replacement and refurbishment of the existing assets and incorporate this as an expense rather than depreciation. The approach may be sparked by a concern with the information on the value of the existing assets and their condition. Or it may be sparked by a concern that the depreciation charges are "too low" and that it will not provide sufficient cash for the funding of asset replacement and refurbishment expenditure. Added to this is the concern is that the large underground assets will have to be maintained mostly in situ, which means that these projections of refurbishment costs are more relevant. Under this approach the costs of refurbishment and renewal for the relevant class of assets is estimated and converted into an annuity, which is incorporated as the cost of asset maintenance in lieu of depreciation for this class of assets. Other assets and expansion capex may still be treated in the normal fashion. The advantage of this approach is that it more closely reflects cash flow requirements and that it reduces reliance on uncertain data on the existing assets. It may well be of some value in developing countries because of the poor information on existing assets and the fact that while there is a lot of pressure on expansion of services for large, old cities, there may also be a large renewal and refurbishment program—especially if there are questions about the original quality of the assets or subsequent maintenance and renewal programs.

Table 4 Revenue Requirement under Different Methods

Assumptions	
Capital structure	
Debt	60%
Equity	40%
Total investment	100,000
Life of the project	40 years
Depreciation (straight line)	2.5%
Required return on investment	15%
Debt	
Loan tenor	15 years
Pricing	8.0%
Annual O&M	25,000
Total water sales	150,000 m³

Source: Author's elaboration

Table 5 Average Tariffs Derived under Different Methods

Revenue requirement	Cash needs	Utility/cost recovery
Operating costs	25,000	25,000
Depreciation		2,500
Allowable return on investment		15,000
Debt service (mortgage style amortization):		
Principal + interest	7,009	
Total average tariff	32,009	42,500
	0.21	0.28

Source: Author's elaboration

The example in table 4 illustrates how revenue requirement is calculated under each method.

Revenue requirements and average tariff are calculated as shown in table 5.[3]

Besides yielding different tariff levels, the two formulas can be distinguished by other characteristics as summarized in table 6.

First, there is a major philosophical difference between the two approaches in terms of how the utility is allowed to operate as an autonomous "going concern." The Utility/Cost Recovery approach, by remunerating the equity component (that is, not only the debt component), recognizes that while equity capital does not carry an explicit cash repayment schedule, it is a capital source that is scarce and has alternative uses, and therefore has an opportunity cost. Using this formula is therefore consistent with looking at the utility as a corporate entity that needs to generate returns, and where owners (regardless of whether the ownership is public or private) make investment decisions based on the expected returns on the capital employed. Moreover, earnings are redeployed when the expected returns exceed the opportunity cost of capital.

Table 6 Attributes of the Cash Needs and Cost Recovery Formula

Cash needs	Utility/cost recovery
Based on cash flow statement Cash accounting	Based on income statement Accrual accounting
Recovers debt obligations only	Remunerates debt and equity capital
Excludes profit element	Includes profit element
Consistent with the vision of the utility as part of the public administration under cash-based budgets	Consistent with the vision of the utility as a corporate entity

Source: Author's elaboration

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3 In the long term, the prices would tend to move downward. Under the Cost Recovery approach there is a gradual decline, whereas under the Cash Needs approach there is a sudden step down at the end of the financing term. In practice, however, the fact that a utility has assets of different vintages smoothes out the time profile of prices under both approaches.

In contrast, the Cash Needs approach is more closely aligned to public administration principles where fund transfers are based on approved annual expenditure budgets and then monitored for cost containment during implementation. Indeed, in public investments that generate no revenues—such as schools, roads, and bridges—the Cash Needs approach is the more appropriate method because there is no feasible way for these assets to recover their capital, not to mention any profits on that capital. Clearly, the Cash Needs approach also perpetuates a strict dependency relationship with its funding agency since it does not typically allow for the buildup of internally generated funds. This is a significant problem for a utility that is striving to become autonomous and capable of sourcing external financing on its own.

Second, the two formulas differ in how finance is regarded in the equation. For example, in line with modern corporate finance philosophy, the Cost Recovery approach strives to maximize ownership value and views external financing as an important and dynamic way to achieve this by increasing future revenues and profits through the expansion of operations. In contrast, the Cash Needs principle, as typically applied in public administration, seeks to contain funding flows and limit external financing, particularly if central or sub-sovereign budgets are tight. External debt is often viewed as a "necessary evil" in order to counter shortfalls in required budgetary transfers and little or no consideration is given to maximizing the value of equity investments by employing the principle of *favorable financial leverage*.[4] As noted, this is particularly relevant to the plight of the infant utility that needs sizable compounded growth in order to achieve full coverage.

Third, while both formulas lead to short-term financial sustainability, the Utility/Cost Recovery formula has a longer-term horizon, leading to greater financial independence. In essence, the formula tends to build up cash in anticipation for future outlays, considering the potential mismatch between cash generation and investment requirements, but also contingencies and potential shocks.[5] The main difficulty with this is that these cash balances often lead to the mistaken conclusion that "the utility is profiting too much," prompting many governments to want to redeploy these funds to other public uses. The Phnom Penh utility in Cambodia is a notable example in this regard. In this case, the utility chose to repay its loan in fear that it would be forced to give up its accumulated cash holdings, leaving little for leveraging other financing to expand countryside development. Moreover, even though the utility was generating high cash balances, its tariffs had not yet realized full cost recovery levels and returns on total investments were actually lower that the average cost of funds. It could be argued that "Special Dividends" are not necessarily a problem provided that the government has alternative and higher yielding uses for the extra funds generated by the utility that would otherwise be earmarked to achieve the growth requirements; provided that the government still has sufficient cash flows to meet its funding needs without needing to borrow beyond prudent limits; and provided that the government recognizes that it may be called upon to provide an equity injection should it be required as a result of increased capital expenditure requirements.

Finally, while the Utility/Cost Recovery formula does incorporate a longer-term horizon, it can potentially yield a nonsustainable solution in terms of revenue requirement. As a general rule, water infrastructure has a very long depreciable life, which could allow for investments to be recovered over 20 years or longer through the depreciation charge. The longer the amortization period, the lower the tariff to consumers. However, a common problem is that financing in developing countries cannot be mobilized in the maturities that are needed and as such, the annual principal repayment to a project is larger that the annual charge for the depreciation of assets. In such instances the net cash flow arising from the depreciation charge would not be sufficient to cover the principle repayment of the loan, resulting in a cash shortfall.

To correct this problem, the Hybrid Cost Recovery Approach is introduced to calculate annual revenue requirement. The approach is basically a combination of the conventional two methods to take specific consideration for debt services requirement when loan tenors are shorter than the depreciable life of the investments (see box 2).

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[4] Generally, whenever the return on assets exceeds the cost of debt, leverage is favorable and increases returns to equity capital.

[5] The impact of contingencies and potential shocks is analyzed in the next section when implicit costs are introduced.

5 FACTORS IMPACTING TARIFF LEVEL DETERMINATION

While the formulas themselves will produce different tariff levels, other factors also contribute. These are

- determination of capital structure
- inclusion of implicit costs
- exclusion of inappropriate costs

5.1 Capital Structure

Under the Cash Needs approach, tariff levels can vary significantly depending on how investments are financed. Very simply, the more external debt that is assumed, the higher the level of explicit cash charges and in turn, the higher the average tariff. This is graphically depicted in figure 1.

Figure 1 Capital Structure and Average Tariff
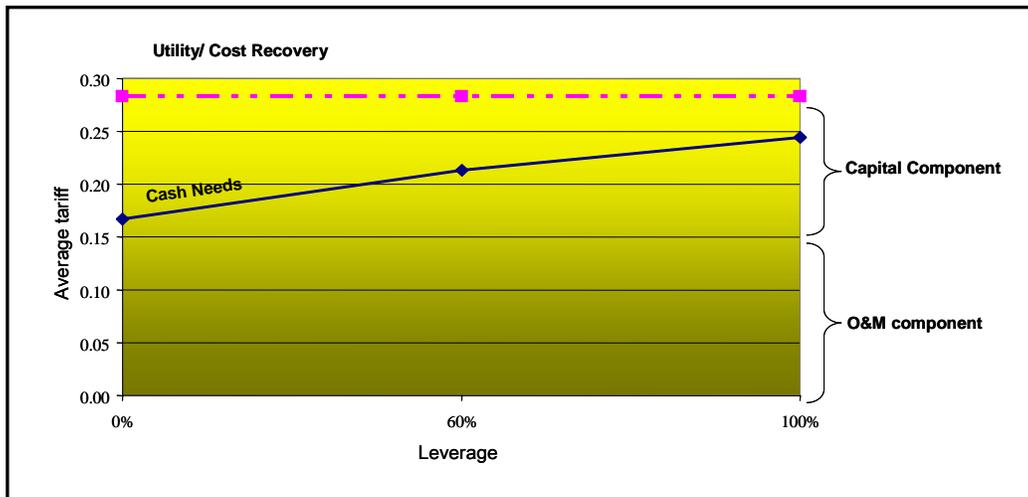
Source: Author's elaboration

The lowest possible tariff can be derived by funding all investment needs through equity, such as governmental transfers and donor grants. These would be regarded as capital subsidy to the extent that neither the repayment of the capital nor a return on that capital is required. With 100 percent paid up capital in the form of capital subsidies, user charges can be structured only to recover specific cash requirements for O&M. This will minimize the direct burden on user tariffs while achieving financial sustainability in the short term. As investments are proportionally financed with more debt, the user charges will need to increase in order to recover the outlays associated with debt servicing.

The capitalization decision for policy makers and owners is important because it shifts the financial burden between users and taxpayers. In other words, there is a certain degree of flexibility that can be applied to balance the need for more affordable tariffs and to retain some, albeit a low level of financial sustainability. Given the scarcity of public resources, central governments can develop strategies such that poor communities can initially benefit from higher equity amounts with the intent of gradually making users assume a proportionally greater part of the financial burden. In the event that the utility has not yet established a formal relationship with external lenders, the government can establish an on-lending arrangement with the utility instead of continuing to contribute equity capital. Such lending arrangements can be tailored (through maturity and interest charges) to fit the repayment capacity of the utility and will contribute toward establishing financial discipline by creating explicit cash charges for the recovery of capital.

Figure 1 also shows that the Utility/Cost Recovery approach yields the same revenue requirement irrespective of how much debt is assumed in the financing equation. In other words, the approach is insensitive to the decision regarding capital structure since it is grounded on the principle that all investment capital should recuperated with a profit to cover the cost of financing, whether it is from debt or from equity.

5.2 "Implicit" Costs

Because of the traditional political resistance to adjust tariffs, "implicit" or contingent charges are particularly troublesome for water utilities. Accrual accounting does adequately consider some implicit charges and as such, the Utility/Cost Recovery formula is a far superior approach for taking into consideration these charges' potential and sudden impact. By comparison, the Cash Needs approach does not at all consider implicit costs unless a specific fund is set up especially for this purpose.

For water utilities, implicit or contingent charges primarily consist of (a) potential currency losses due to devaluations in the local currency, (b) loss of asset value due to heavy inflation, (c) potential losses from nonpayment of invoices, and (d) failure to carry out schedule maintenance. Environmental impacts and water resources can also be viewed as implicit costs to the extent that explicit charges that may affect the need to increase tariff levels may eventually be imposed.

Figure 2 Cash, Non-cash and Implicit Charges

Cash and Non-cash Charges	Implicit /Contingent Charges
O&M Changes in working capital Principal and interest payments on debt Recovery of investment costs Profits	Currency risk Water resources O&M not done Bad debts Environmental costs

Source: Author's elaboration

The major problem with implicit costs is that they eventually convert into explicit charges and can throw off the utilities' cost structure. This may occur gradually or as a result of sudden events, such as macroeconomic shocks forcing steep currency devaluations or inflationary pressures. Such events can increase the cost of utilities sharply, resulting in cash flow losses when tariffs cannot be adjusted promptly. In cases of macro shocks, the problem is particularly acute because there is even greater resistance to increasing tariffs during economic downturns. As such, many water utilities with cost structures that are substantially vulnerable to currency devaluations have been thrown into a financial tailspin by the financial crises in Asia, Latin America, and the Russian Federation.

Accounting for these factors in advance by provisioning against future losses or cost increases can provide an effective buffer against these sudden shocks. This is done by booking the estimated and eventual charge in anticipation. In doing this, the estimated revenue requirement in the immediate term also increases but it is normally amortized over a longer period of time such that the effects on the average annual tariff are minimized.

The concept of implicit costs takes on an added dimension in estimating revenue requirements because it forces the utility to move from a static and short-term approach in analyzing costs to a more dynamic and long-term planning process. In essence, moving to a dynamic approach forces the utility to begin to simulate expectations and reflect more on its long-term sustainability.

5.2.1 Foreign Exchange Risk

With regard to implicit costs, foreign exchange losses are perhaps the most difficult to deal with. In the absence of a local capital market that can mobilize long-term finance in local currency, water utilities inevitably will have to rely on financing from foreign sources for continued growth. This in essence creates a currency mismatch between revenues denominated in local currency and obligations denominated in foreign currency. As devaluations in the local currency occur, the debt service cost rises. One approach to deal with this problem is to put in place a tariff adjustment formula that allows the utility to increase tariffs in response to currency movements. However, experience has shown that such automatic adjustment formulas, particularly for publicly owned utilities, are extremely difficult to implement, especially if the devaluations are steep and sudden.

The importance of foreign exchange risk cannot be overstated for private investors, either. In the wake of the various Asian, Russian, and Argentine financial crises, international developers, investors, and lenders have ranked foreign exchange risk as one of the main obstacles to their involvement in water supply and sanitation as well as other infrastructure projects. This concern is exacerbated by the lack of any meaningful instrument available in the market that is able to mitigate foreign exchange risk.

Because of the political difficulty of adjusting rates to reflect currency movements, there is a need to anticipate the cost of such devaluations and to spread this cost over a number of years, preferably over the life of the foreign-denominated loan. This would be done through a forward planning process by estimating the eventual losses that would accrue as a result of anticipated local currency devaluations over the life of the loan. Such estimates can be continually revised based on actual occurrences. Based on this, an annual provision would be taken to anticipate actual losses as they occur. Provisions or allowances, such as depreciation, are non-cash cost items that are booked to the accounts. Their value would be reflected on the Income Statement to offset revenue and in turn, lower annual profits. As a non-cash item, such provisions would not affect the cash flow statement until these losses are actually incurred and cash balances would develop until such losses are realized. Provisioning for foreign exchange losses will therefore affect the determination of the Utility/Cost Recovery formula by increasing the revenue requirements. By contrast, the Cash Needs approach would not change.

Provisioning for foreign exchange losses constitutes an important milestone toward a utility's long-term financial sustainability. As experience has demonstrated, currency devaluations can be quite significant but there are no standard guidelines on the "amount" that should be provisioned for such risks.[6]

5.2.2 Inflation Risk

Many governments in developing countries are effectively tackling inflationary pressures, and cases of hyperinflation are much less frequent today than they were just a decade ago. As such, the loss of value of fixed assets resulting from high inflation rates has not been a significant problem to utilities for some time. Typically with high inflation rates, the original value of the assets, which is booked at historical cost, tends to lose its relative value and as such, the related annual depreciation charge is also understated. To compensate for this, the fixed assets would have to be periodically reviewed for a potential revaluation and the annual depreciation charge would be adjusted accordingly.

Despite this, local currency devaluations do impact operating costs if such costs have high import content, primarily in terms of power, chemical, and equipment costs for O&M. In such cases, the cost of these inputs also rises even though their nominal cost in the foreign currency may remain the same. The difference between the effect of local currency devaluation on these cost categories versus on foreign debt as described above is that these input items are seldom imported directly and thus show up as local price increases from in-country distributors and vendors. The financial impact is the same, however, and the tariffs would have to be adjusted accordingly for such situations.

If the adjustment process is complicated in the short term, the utility must again rigorously pursue a forward planning process in order to ensure that the effects of such cost increases are taken up before their impacts become too substantial.

5.2.3 Shortchanging Scheduled O&M

Utilities routinely cut or are forced to cut investment and O&M programs when faced with budget constraints. This is normally viewed as an expedient way to deal with a financial issue since the consequence of scaling down investment spending is not readily noticeable in the immediate term. However, the effects wind up in other performance indicators, particularly in unaccounted-for water (UFW); and many years of neglect will usually lead to unsustainable UFW levels, which only major investments can correct. This is true for technical as well as nontechnical losses.

Accounting practices do not take deficiencies in scheduled maintenance into account. There are no accounting rules that can effectively deal with this issue or other investment issues per se. Rather, this responsibility should rest on management and owners to ensure that technical reports highlight maintenance activities and ensure that adequate budgets are made available.

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[6] For further analysis and categorization of foreign exchange risk, see Aldo Baietti and Peter Raymond, "Financing Water Supply and Sanitation Investments: Utilizing Risk Mitigation Instruments to Bridge the Financing Gap." Water supply and Sanitation Sector board Discussion Paper Series, Paper No. 4. January 2005. The World Bank. Washington D.C.

5.2.4 Consumer Bad Debts and Other Performance Inefficiencies

Accrual accounting allows for the utility to books its revenues based on invoices issued. However, if collections performance is poor, what is necessarily booked as revenue may not be collected promptly—or even at all. So while the income statement may reflect a financially sustainable situation, actual cash flow may be significantly below the recovery of legitimate costs of doing business. Similarly, inefficiencies in inventory management may also reduce liquidity and tie up too much cash in working capital.

Both formulas, in their simplest form, ignore performance inefficiencies because revenue requirements in both cases are based on "costs" categories rather than what the utility is expected to collect or temporarily hold in working capital. In reality, the performance of a utility is seldom 100 percent perfect because there is always some level of inefficiency that needs to be incorporated into the revenue requirement calculation. If not, the actual nonpayment of invoices may lead to an unsustainable financial condition.

The best way for the utility to deal with these issues is to adopt accounting principles so that allowances for these "appropriate" inefficiencies can be taken. For example, an allowance can be made for nonpayment of invoices of, say, "bad debts," which would include a charge to the income accounts.

5.2.5 Water Resource and Environmental Costs

Water resource and environmental costs do not currently pose significant problems as implicit costs, but may do so as water becomes more and more scarce in the future. Generally there is still strong resistance to charging for the resource as water is still seen by many as a "public good." However, in the longer term, particularly in arid countries where water is scarce, a utility's cost structure may materially change in the near future by the imposition of charges on the actual water use. This may resemble the "resource depletion charge" that is common in the accounting of mineral and oil extraction activities.

5.3 Appropriate or Allowable Costs

Private participation contracts have introduced the concept of "allowable" costs with the intent of restricting operators from undertaking certain discretionary expenditures that may not be directly related to the efficient management and operation of the utility. The concept of allowable costs has also been introduced in private sector participation (PSP) contracts to limit performance inefficiencies to certain agreed levels. The intent in this case is for the private party to accept a certain degree of risk associated with the efficient running of the utility. If performance fell below certain agreed levels, the related cost would be shouldered by the operator and would not be included in the revenue requirement calculation to set average tariffs.

The concept of "allowable costs" has direct merits for public utilities because it would better clarify which costs can appropriately be included in the revenue requirement calculation to form part of the tariff. The problem, however, is that unlike in PSP contracts, usually there is no clear public party that can enter into a risk-bearing relationship in the event performance indicators fall below certain acceptable levels. A utility on its own cannot absorb these unallowable costs unless a specific fund is set up for this purpose. In such circumstances, the fund would have to be sourced from other means rather than from the utilities' own internal cash savings. Otherwise the users would continue to shoulder these inefficiencies, which is contrary to the reason for introducing the concept in the first place.

The logical choice then lies with either national agencies or municipalities—as owners of public utilities. However, there are few instances where this kind of review is actually undertaken or for that matter, where nonallowable costs are shouldered by these agencies and not users. Costs incurred by the public utility are often passed on to users regardless of whether the costs or cash outlays are "appropriate." The exception is where policy makers develop reference tariffs levels that in their minds would be acceptable to the consumer public. However, this is usually handled in an ad hoc way and without a full understanding of the utility's cost composition and make-up. What normally transpires in such cases is that utilities are forced to work backwards from these reference rates in making the finances work, and in the process they wind up throwing out the entire principles on which revenue requirements should be established.

A utility can undertake certain activities, giving rise to inefficient management and operations. High UFW and system losses, collection problems, overstaffing, and others all contribute to inefficiencies and higher costs. These problems can be dealt with through sound management practices and remedial action programs. More difficult, however, are structural problems that stem from poor investment planning and borrowing decisions, particularly by oversizing system capacity without addressing the revenue base that can sustain the debt-servicing commitments. For example, the Gia Lam water treatment plant in Hanoi, Vietnam has a capacity of 30,000 cubic meters a day, but daily output is limited to 5,000 to 10,000 cubic meters because of inadequate piping capacity. There are countless examples of similar cases throughout the WSS sector. These factors lead to high overhead costs and debt-service requirements, which can drain the financial resources from the utility without any benefits to the consumers. More important, consumers could be asked to absorb these inefficiencies, or otherwise the cash commitments of the utility would not be met, drawing it into a precarious financial condition.

Structural inefficiencies often come about because the related investment decisions involve central or local government levels that are not ultimately accountable for the financial consequences. At times, utility managers or consumers are the last to agree on the need for a particular investment when the financial implications are clarified. So it is ironic that both utility managers and consumers are ultimately left to make ends meet.

Demand-based approaches to system planning and design are contributing toward reducing inefficient investments by focusing on systems design options that consumers can both afford and are willing to pay for. The participatory approaches allow for consensus to be developed on the need for a particular investment and its implications of tariff levels. However, the many inappropriate investments that have already been undertaken need to be rationalized before any headway can be made by the affected utilities in moving toward a higher level of financial sustainability.

In many cases, the rationalization process would involve some elements of a diagnostic review of "performance audit" that would (a) identify inappropriate related costs arising from excessive inefficiencies, (b) quantify the cost consequences arising from these inefficiencies, and (c) determine viable solutions for permanently correcting the problem. In most cases, incidences of unsustainable debt must be squarely addressed through financial restructuring, by "writing off" or rescheduling the debt on the balance sheet. Depreciation charges related to inefficient fixed investments should also be reduced. Moreover, depending on the situation in the sector, particularly where coverage is low, oversized systems assets could be made productive by utilizing these assets through expansion of coverage. In essence, the problem of inappropriate costs from underutilization can often be corrected by expansion. Similarly, investment would certainly be needed to improve operational performance.

The importance to policy makers of "allowable" or "appropriate" costs should be clear as this concept begins to address equitable tariff levels systematically. It rationalizes the amounts that should be paid by users versus the amounts that should be absorbed by the utility's owners. Moreover, performance audits can shine the spotlight on abuses of the planning process and hold parties accountable for the inefficiencies they created.

6 SUMMARY OF RECOMMENDATIONS AND POLICY IMPLICATIONS

Utilities in developing economies face formidable challenges in achieving long-term sustainability. In part, this is because of utilities' widespread failure to recover the full costs of service, but also because external financing sources are often unpredictable and unreliable. For many utilities that are starting from low coverage rates, the inability to secure expansion financing poses a severe sustainability burden as their need to continuously invest in order to achieve full coverage is often derailed.

Given these challenges, achieving long-term sustainability entails a steadfast process of (a) lessening a utility's dependence on subsidies while increasing reliance on user tariffs as the main source of financing; (b) allowing the utility to generate excess cash flow that can be reinvested and potentially re-leveraged; (c) adopting a long-term horizon in the setting of revenue requirements, ensuring that the utility will have access to cash to face sudden cost increases, contingencies, and future outlays; and (d) ultimately gaining financial independence to source external private financing based on the enterprise's own creditworthiness.

Two approaches have been traditionally used to calculate revenue requirements and average tariffs: the Cash Needs method and the Utility/Cost Recovery method. Of the two, the latter is far better suited for infant utilities aiming to achieve long-term sustainability because it allows for the buildup of internally generated funds that are critically needed to develop financial independence and leverage additional external financing on their own. In essence, the Cost Recovery formula allows a utility to recover investments and earn profits that remunerate the equity capital employed. In contrast, the Cash Needs approach only factors current cash needs and maintains a strict dependency relationship with the funding agency. Moreover, with the inclusion of "implicit costs," this Cost Recovery approach will generally build up cash in anticipation and to offset future contingencies and potential shocks, which are often considered a serious problem among utilities in developed countries.

With the adoption of the Cost Recovery approach, however, a number of issues arise. Cash balances may be often misunderstood as "excess profits," prompting many governments to want to redeploy these funds to other public uses. Utilities need to be sufficiently autonomous to manage their own finances within agreed principles. Public administrators need to understand this—and that internally generated funds and additional shareholders' equity are essential financing elements needed for continued development and growth.

Moreover, when factoring all explicit and implicit costs, the Utility/Cost Recovery approach leads to higher revenue requirements and average tariffs. This may pose issues of affordability, particularly in poorer communities. The result is a dilemma among policy makers between affordability and financial sustainability. In such circumstances, the utility can gradually move toward cost recovery tariffs by (a) starting off from a Cash Needs approach where only explicit cash commitments are covered by user fees; (b) progressively moving to the Utility/Cost Recovery formula, in its simplest form; and (c) then, as feasible, adding complexity to the formula by including implicit costs. In such cases, policy makers must shore up any financing gap that is realized in the event of sudden cost increases.

Finally, in deriving revenue requirements, policy makers must ensure the adequacy of costs that are used in the calculation such that high inefficiencies are *not* passed onto consumers. The calculation of revenue requirements and average tariffs must be equitable and consumers must not be penalized for poor decisions of the past. Dealing squarely with inappropriate costs and unmanageable debts is a necessary precondition to placing utilities on a sound financial sustainability course.

Given the conflict pitting affordability against cost recovery, the removal of these inefficiencies, or "inappropriate costs," by way of restructuring the utility's balance sheet may free up resources without burdening consumers. This may also have the effect of strengthening the utility's financial condition and allowing it to graduate to a higher financial sustainability threshold.

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