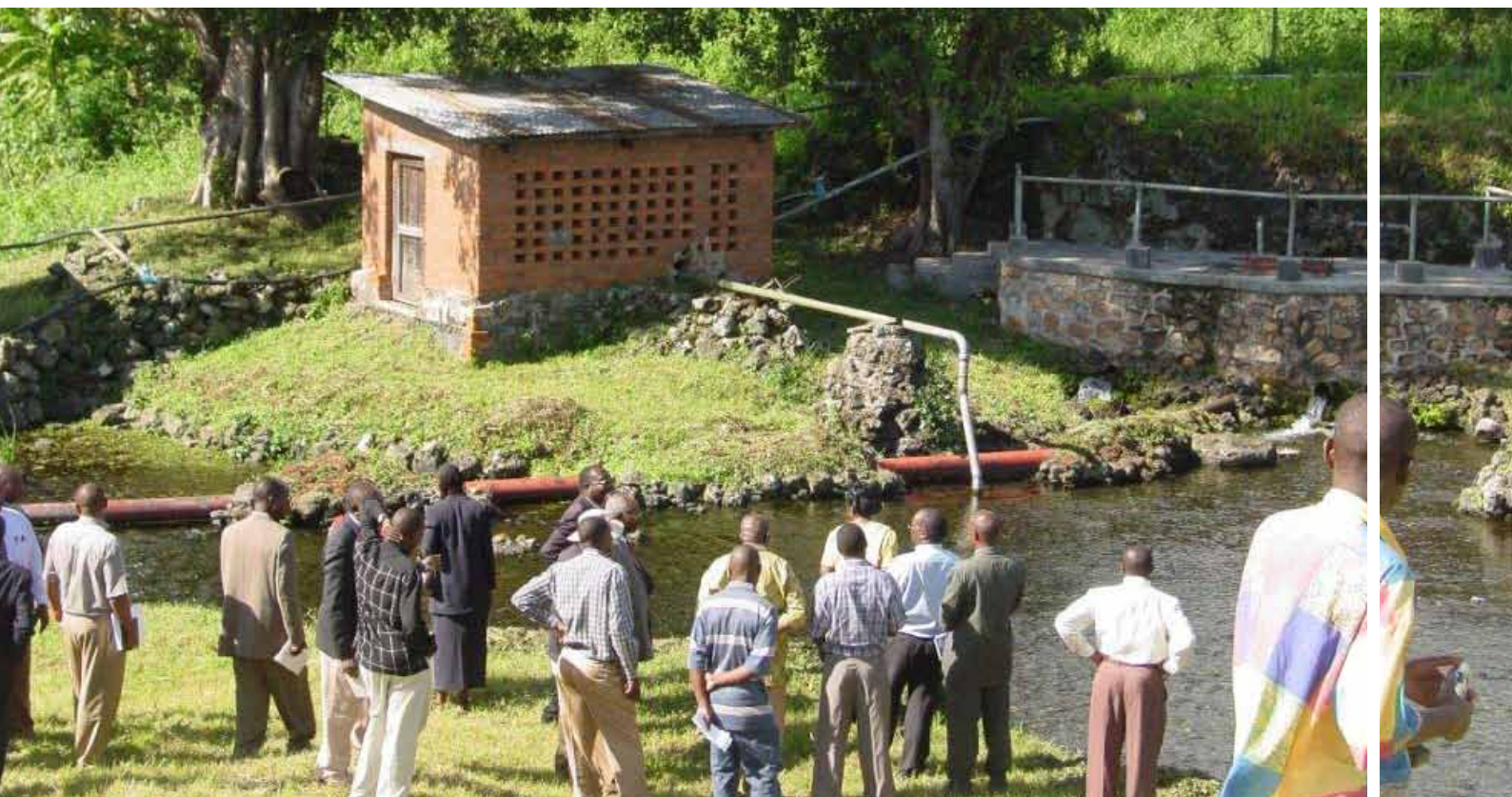# WASHCost

The cost of capital:
Costs of financing capital expenditure for water and sanitation

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WASHCost is a five-year action research project investigating the costs of providing water, sanitation and hygiene services to rural and peri-urban communities in Ghana, Burkina-Faso, Mozambique and India (Andhra Pradesh). The objectives of collecting and disaggregating cost data over the full life-cycle of WASH services are to be able to analyse costs per infrastructure and by service level, and to better understand the cost drivers and through this understanding to enable more cost effective and equitable service delivery. WASHCost is focused on exploring and sharing an understanding of the true costs of sustainable services (see www.washcost.info).

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Acronyms

CapEx   Capital Expenditure
CAPM   Capital Asset Pricing Model
CoC   Cost of Capital
NGO   Non Governmental Organisation
WACC   Weighed Average Cost of Capital
WASH   Water, Sanitation, and Hygiene

The cost of capital:
Costs of financing capital expenditure for water and sanitation

This briefing note investigates the cost of financing capital expenditure, usually referred to as the cost of capital, and explains why it is one of the key building blocks that make up the total costs of providing water and sanitation services that last. Highly subsidised costs of capital with very long repayment periods may not be recognised as a cost, particularly when the time frame falls beyond the scope or years of most planners' and politicians' involvement.

Conventional water and sanitation, which consists mainly of piped water and sewerage systems, can be described as 'capital intensive', requiring very significant capital investment. Non-networked, often rural, water and sanitation is also capital intensive, although to a lesser degree. Gradually, systems of non-networked water and sanitation infrastructure are being replaced with more complex piped systems. This results in an increased need for capital.

Governments are borrowing money to finance infrastructure. The use of scarce resources, in this case 'capital', also referred to as 'finance', comes with a cost. In the rural water and sanitation sector, much of this cost of capital investment is incurred by government or donors, and is a relevant form of subsidy to rural and peri-urban users. Whoever pays it, the costs exist and will be paid by somebody.

Even subsidised loans with interest rates lower than 1% can lead to significant annual expenditures, as shown in our example below, when the overall repayment period and the size of the project are taken into account. Governments and donors would benefit from understanding these costs and their implications. Consumers, and civil society on behalf of users/consumers, will also benefit from understanding the total costs of services (irrespective of who actually pays what part of the total).

This briefing note outlines some of the key issues involved in understanding the cost of capital and its components, and describes how these concepts relate to rural and peri-urban water and sanitation.

1.   Taking cost of capital into account

There are two ways of thinking about the cost of capital. These are:
- financial cost of capital (the main focus of this briefing note), and
- economic cost of capital.

The economic cost of capital is the value of that scarce capital if it was invested in the best alternative use. For instance, governments with limited resources could take a large loan to invest in agriculture, if they were likely to receive higher returns from the capital invested. The economic cost of investing that money in water and sanitation would therefore be the lost return they might have got from agriculture (minus the return they would actually get from water and sanitation). A government might decide that the social benefit of choosing to invest in water and sanitation was worth the economic cost of forgoing the investment in agriculture – but the economic cost still exists.

However, the focus of this briefing note is on the financial **cost of capital**. This means the costs met by households (for micro-finance loans), small scale private providers (for bank borrowings and profit), corporatised[1] and private service providers in urban areas (for debt finance and returns on equity) as well as government departments.

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1   A corporatised provider is a governmental body that has been converted into a state-owned corporation and is expected to work in a similar way to a private business.

With increasing reliance on conventional sources of finance, it is important to investigate how the financial cost of capital will make up a larger element of costs in the future, particularly as systems expand (scaling up) and are enhanced (improved service quality with closer access).

This briefing note concludes with an example of a loan given for a large rural water and sanitation project in one of the WASHCost countries. The service charges (interest) per year are relatively low, but the period is long. The resulting costs seem affordable in the short term but are substantial over the period of the loan. The example shows that there is a need to reflect the cost of capital involved in loan repayments in the planning and budgeting of the water and sanitation sector.

2.   Long term implications of the cost of capital

To finance investment programmes, the water and sanitation sector in low and middle-income countries normally depends on budgetary allocations from government (based on tax revenues and/or international budgetary support). This funding is often supplemented by 'free' project grants or low cost subsidised loans from multi-lateral and bilateral lending agencies, or from a variety of other sources such as aid agencies and NGOs, or a combination of these sources.

It is increasingly likely that countries will need to resort to additional loans to scale-up service provision to meet challenging MDG targets and greater user demands. An increasing proportion of these loans are likely to be funded through commercial lenders, but even when they are subsidised, loans bring with them financial obligations that may not have been taken into account when planning and budgeting. The costs often represent long term commitments and may affect future cash flow and the ability to renew and reinvest in water and sanitation systems. Those who take out loans are usually obligated to pay back both the capital borrowed – the **principal** – and interest on the loan.

Traditionally, the main concern regarding borrowed capital has been to manage cash flow and budgets in order to pay back the principal sum borrowed. As water supply systems are aggregated (linked up between different villages), and services are expanded to more people, service providers will increasingly function in similar ways to commercial businesses in how they account for and manage their capital and its consequent costs. Governments are increasingly moving towards 'fixed asset' accounting to ensure that they are managing those assets, and the capital invested in them, in the most efficient way.

The future challenge will focus on the repayment of the interest more so than the repayment of the principal loan.

3.   Defining cost of capital

Box 1.

The **Cost of Capital** (CoC) is the interest rate paid on any funds borrowed to finance **Capital Expenditure** (CapEx) plus any returns to the owners of the system, representing their cost of equity.

If there are no loans, because CapEx has been paid for directly by government or donor, and the owner or asset holder does not require any return on their equity investment, then there is no financial Cost of Capital.

If a government has borrowed money that is not sector specific or has taken a loan to fund a water and sanitation programme, then there is a cost of capital to the government.

Different actors in the supply of Water, Sanitation and Hygiene (WASH) services have their own costs of capital. Where microfinance is used to support household sanitation, for example, there is an interest cost attached to the micro-borrowing. Small scale independent providers on the edge of a city have to recover the cost of any loan from a bank in order to pay for drilling a borehole and building an overhead tank. This cost is added to the daily rent that water carriers, carters or tanker operators pay to the owners of their carts or tankers. Such small scale enterprises also need to make a enough profit to cover the cost of their own capital invested, in addition to the interest they pay on loans. Any such *dividends* on the equity invested may not be apparent to customers as it is wrapped up in the overall charge, but it is nevertheless a cost that needs to be understood.

Urban utility service providers, which should include services for the peri-urban poor, may be commercialised state owned enterprises that are required to achieve a return on the capital used, over and above the interest rate paid on any loans. This requirement may be made, as part of the total cost of supplying water, to ensure that scarce capital in the public sector is used effectively and efficiently. Where urban service providers are privatised, there is clearly an expectation of returns to providers of loans and to providers of equity, i.e. the investments by the owners.

Because there may be a variety of financial arrangements and forms of ownership, tracking these costs may present a challenge.

The most basic loan requires the borrower to repay the principal loan and any added interest. In larger service providers, where lenders have confidence in the borrowers, paying back the principal is frequently managed through cash-flow procedures, often with loans being extended or rolled-over into the future.

In the life-cycle cost approach, repayment of the principal is part of cash flow management for capital expenditure. However the interest, that can be thought of as the cost of 'renting' that principal or capital for the borrowing period, is recognised as the cost of capital.

4.   Financial and economic cost of capital

The cost of capital is particularly relevant in the case of service providers, rural or urban, that operate more like utilities, with ongoing financial responsibilities for managing fixed assets, rather than as one-off project implementers. The ongoing challenge has always been to understand and report on the different aspects of the costs of investment in long-term assets, relative to the day-to-day costs of running or operating a system or activity.
In an example of privatised utilities in a high-income country, operating expenses make up approximately 40% of the total, capital maintenance expenditure represents 30% and the cost of capital makes up the final 30%. If it is possible to access lower-cost public capital (at a risk-free rate) then the proportion of the cost of capital decreases.

4.1   Financial cost of capital
Capital is accumulated wealth or money that can be used to invest in long-term 'fixed' assets. In the case of the WASH sector, this includes pipes, pumps, boreholes and toilets. Capital is a scarce resource, which has a value to those who borrow and those who lend. Those who own that capital or wealth may want others to use it in exchange for a payment or fee – in the same way that the owner of a house might rent rooms in exchange for a payment. When people make capital available for someone else to borrow, it is sometimes known as *debt capital*.

The fee or 'rent' for using someone else's capital is, as explained above, the cost of capital. This is usually a percentage of the amount being used. If the capital is borrowed as a loan, the cost is known as the *interest rate*.

The interest rate varies according to the risk associated with the organisation taking the loan; the higher the risk, the higher the interest rate. In developing countries, individuals, households and communities are perceived to carry higher risk than national governments or private companies.

If the person who owns the capital does not lend it but invests in an activity as a shareholder or part-owner, then the return they expect to receive on *equity* capital is known as a *dividend*, paid as an annual share of the *profits* or *return* achieved in that activity. In a similar way to interest rates, owners expect a higher return on their investment (dividends payment) if they are investing in higher risk organisations.

More complex enterprises, whether private or state owned, normally finance their investment activities through a mix of debt and equity. The balance between debt and equity is known as *gearing* or *leverage*, which is usually expressed as the percentage of debt relative to the amount of equity, or relative to the total capital employed in the activity (debt plus equity).

The total cost of capital for an activity which is financed through a mixture of debt and equity is therefore the sum of the interest payments and the dividend payments. Together they are usually known as the *Weighted Average Cost of Capital* (WACC)– the 'Weighted Average Cost of Capital' – weighted according to the relative proportions of debt and equity.

In water and sanitation provision, the service provider or government might borrow from a development or commercial bank in order to develop, improve and extend services. The cost of capital is the interest rate they pay to the bank, usually on an annual or bi-annual basis. By the end of the loan period the bank will expect to have received back both the interest payments and the original capital that was loaned. The original capital, *the principal*, might be paid back regularly during the lifetime of the loan. This is the same as a repayment mortgage on a house. Sometimes there is a *grace period* at the start of the loan when payments cover only the interest, to allow time for fixed assets to be constructed and to start delivering services (and maybe revenue) before repayments have to be made. Sometimes the grace period covers all or part of the interest as well.

Alternatively the loan might be on an 'interest only' basis so that annual interest payments are made and the principal is only repaid in full at the end of the loan period. In business it can be common for that principal to be *re-financed* or *rolled-over* so that it continues as a new loan, for a new period, again with an appropriate, probably altered, interest rate. Because the provision of water and sanitation (particularly networked water and sewerage) is such a capital intensive activity, which constantly requires additional capital to enhance services, the normal pattern for commercialised providers is not to pay off all their debt, in order to keep tariffs low. As long as the interest is being paid at the required level, and the gearing ratio is within accepted limits, the lender is normally pleased to continue the loan for as long as it is needed because it saves them having to find alternative borrowers for their funds. This is another reason why understanding the cost of capital is important in water and wastewater services provision – there needs to be that assurance that the debt can be *serviced*, i.e. that the interest rate can be paid. Then it is usually possible to borrow what is required to improve water and wastewater services further.

A *soft loan* is one that has been subsidised by the lender with a reduced cost of interest (below market rate) and may also include an extended period for repayment of the principal. If a soft loan is not repaid and is written off by a donor, the cost of capital to the sector or government effectively disappears. However, if a country or a sector ceases to make interest payments due to adverse economic conditions, this will make it much harder for service providers to access future finance to extend and enhance services.

As public water providers grow and develop into utilities, perhaps as an aggregation of multi-village scheme providers, governments begin to realise that there is an ever-increasing need for additional capital to improve and expand services. Where a government owns a utility it may require service providers to generate a return by charging a cost of

capital on the public money provided. This can be seen as a dividend on the government's equity in accounting terms. They may not require that return to be given back in the form of dividends but perhaps used as a means to generate low cost capital for the next round of expansion and enhancement.

In this way, governments try to influence their state owned enterprises to allocate and use scarce resources in the most effective and efficient manner.

Additionally, at a project level, it may be that no cost of capital is directly charged on the investments being built. However the government providing the finance might have borrowed this money from the World Bank and is paying interest on it. Often these costs of capital are incurred at **macro** level and therefore represent an **indirect cost of capital** that cannot be attributable to an individual project or investment in the water and sanitation sector.

Box 2.

The financial cost of capital is made up of the weighted average of:
- interest rates paid on loans/debt directly;
- interest rates paid on loans/debt indirectly when applicable; and
- dividends paid out of any surplus revenue to owners/shareholders relative to the equity invested.

4.2 Economic cost of capital

When capital is given or **granted** to an activity or enterprise, there is no financial cost of capital. The provider of capital is investing resources without requiring any dividends or return – i.e. a zero cost of capital to the recipient. Those who give aid money see the return as being improved services and living conditions for people and communities who cannot finance services themselves.

A concern about reliance on grant aid (especially a failure to maintain interest payments on loans) is whether such practices lead to dependency and delay the time when the sector can be self-supporting. The logic behind grant aid is that it is a bridge leading to more sustainable forms of finance.

Grants still represent a scarce and valuable resource, even when there is no formal cost of capital to the recipient. Economists refer to the **opportunity cost of capital**, which is the return society might have received by using that scarce resource in the best alternative activity. That alternative activity could have given a financial return to the donors of the capital – a financial benefit that they choose to forego – or it could have delivered other economic benefits or return to society. For example it could have been spent on improvements to schools or hospitals, rather than on water and sanitation. This helps us to understand the need to use this scarce resource in the best possible way, even if the capital appears to arrive as free money.

5. Calculating the cost of capital

5.1 Capturing actual expenditures of financial costs of capital (historical perspective)

It is probable that the majority of government and non-government expenditure in the sector has a cost of capital attached to it and represents a genuine cost of providing water and sanitation services. These costs however may not be immediately apparent in responses to surveys, regional or project accounting, or even at the level of water or sanitation departments.

Table 1 provides guidance on where financial (direct and indirect) cost of capital and economic cost of capital may be found at the household level and all the way to government departments.

To make comparisons easier, interest rates are best expressed in **real** terms, that is with the level of inflation stripped out, rather than the published **nominal** terms[2].

Table 1. Cost of capital disaggregated by investor and likely purpose

Investor and likely purpose	Where will the cost of capital occur and where can it be found?			
	Financial cost of capital			Economic cost of capital
	Interest (direct)	Interest (indirect)	Return to equity	
Household to invest in household (HH) connections or latrine/septic tank construction.	Interest rate charged by banks or private lenders (including family members), microfinance institutions or family level revolving funds.	The interest rate which microfinance institutions and other lenders are paying to finance their lending, less any direct interest rate charged.	No return to equity because the investors are the HH themselves.	The opportunity cost of putting money into a bank compared with alternative better uses.
Community to finance a tap stand, a borehole, significant repairs or maintenance to infrastructure.	Same as above.	Same as above.	May exist as a community surplus (e.g. communities selling water to outsiders) and dividends distributed to members or re-invested in other productive uses.	Same as above.
Government department financing the provision of water and sanitation services including extension and enhancement.	The interest on loans taken out by the government department for WASH projects – the typical interest rate charged may appear on the department's income and expenditure statements.	Government borrowing interest rates of large loans, parts of which have been allocated to the water department.	Government departments will not distribute dividends as a return to equity, however surplus revenue from the water tariffs may be absorbed and fund other activities and not be re-invested in water services.	The opportunity cost of investing in education and health; this could have policy implications for the cost-effectiveness of government expenditure.
Corporatised service provider (sometimes known as parastatal)[3] financing the provision of water and sanitation services including extension and enhancement.	Interest rates paid on loans.	Interest rate of macro level governmental loans.	Some organisations will have a target of 1% or 2% return on equity which is usually reinvested. The majority have negative returns to equity.	

(Table 1 continued on next page)

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2   There are occasions where circumstances and/or governments exert influence over their banking system to keep interest rates artificially low – sometimes below the level of inflation – and, as such, there might be a negative nominal cost of capital.

3   A corporatised provider or a parastatal is a governmental body that has been converted into a state-owned corporation and is expected to work in a similar way to a private business.

Level of investment and likely purpose	Where will the cost of capital occur and where can it be found?			
	Financial cost of capital			Economic cost of capital
	Interest (direct)	Interest (indirect)	Return to equity	
Private service providers financing the provision of water and sanitation services including extension and enhancement.	Costs of loans – larger scale private service providers should provide the most transparent data on their interest rates through their annual financial statements.	Not applicable.	Equity provided to shareholders/ investors often at 5-10%. CoC may be higher than other options – but the idea is that they will deliver overall cost saving through increased efficiency.	Not applicable as there is no 'best next alternative'. The cost of capital reflects the full cost of other investments at the same level of risk.
Small scale private service providers financing the provision of water and sanitation services including extension and enhancement.	Disclosed interest rates from the vendors (or commercial bank borrowing rates where not disclosed – noting that such finance often comes from relatives and local business partners at widely varying rates).	Not applicable.	Equity provided to shareholders/ investors often at 10-20%. CoC may be higher than other options – but the idea is that they are providing a higher level of service where no one else is.	Same as above.

Difficulties encountered in collecting these costs might include the following:
- In household and community level investments, it might be difficult to access interest rates charged by family members/friends.
- For private service providers, if return on equity information is not available, a guideline amount can be obtained using the Capital Asset Pricing Model[4].
- For small scale private providers, if the interest rates charged are not disclosed they could be estimated using the available commercial bank rates. Equity returned, if not disclosed, could be estimated through a financial analysis of the business.

5.2   Estimating financial costs of capital (forecast perspective)

The prime concern for using the life-cycle cost approach is to reach sustainable services, which can expand to meet increased demand (quantity), quality, reliability and accessibility over time. Consumers, governments and donors therefore need to have a realistic understanding of the actual cost of the services being delivered – so that they can budget appropriately and continue to give scarce capital resources where they are needed most, while recognising that it may not be possible to continue subsidising the cost of capital for ever.

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4   This is a model used to determine a theoretically appropriate return (cost of) equity for an investor and is calculated as: the Risk-free Rate (RFR), an investment return that could be achieved elsewhere at no risk (by buying government bonds for example), plus Equity Risk Premium (i.e. the amount that is charged by investors risking their money or the amount over interest the owners of equities want to get out) multiplied by the Beta Factor which is a measure of volatility of any enterprise in the market. The lower beta factor = the less volatile the stock.

To know the ideal cost of capital for services, it must include a valid estimate of the total actual cost of capital, irrespective of whether those who benefit from the use of this capital are currently paying that cost.

To calculate the ideal cost of capital when there is no return on equity required and there are no loans or when subsidised loans are involved, it is best to use the ***interest rate*** that the national government pays to access finance when it issues government bonds or debt. Where private sector lenders are involved then the interest rate that commercial banks charge to industrial and commercial borrowers can be used. Both these rates are an indicator of the cost of the supply and demand for capital in any country.

It is recommended that the following rates for calculating cost of capital are used:
- For government or donor budget/grant funded investments, use government's borrowing rate.
- For commercialised or corporatised service provider funded investments, use the commercial bank interest rate.
- For non-state providers unable to report their actual cost of capital, use the commercial bank interest rate also.

The normative or ideal cost of capital is what the cost would be when only unsubsidised loans and equity are taken into account. Estimating the normative or ideal cost of capital for corporatised public providers implies calculating the weighted average of:
- market level interest rates on loans/debt;
- market level profits/dividends on equity.

How to determine the market level of interest rates and equity is explained in further detail in Annex 1.


6.   Example of a soft loan for rural WASH

This example shows what the cost of capital is when an interest rate appears to be low. In this case, a governmental body borrowed US$ 22 million from a development bank. The objective was to improve the water and sanitation situation for around a million people. The loan was for a 50 year period. It was agreed that for the first 10 years, from 2010 to 2019, no repayment of principal would take place.

The development bank charged a fee of 0.5% per year for money that had been allocated and reserved but not yet used (known as a ***commitment charge***) and 0.75% in interest for the money that the project was already spending.

The repayment of the principal, starting in year 10, is 1% for 10 years and 3% over the final 30 years. The annual cost of capital can be seen in Figure 1, averaging approximately US$ 100,000 per year with total commitment and interest payments over the period of approximately US$ 4,900,000.

Figure 1. Yearly interest payments
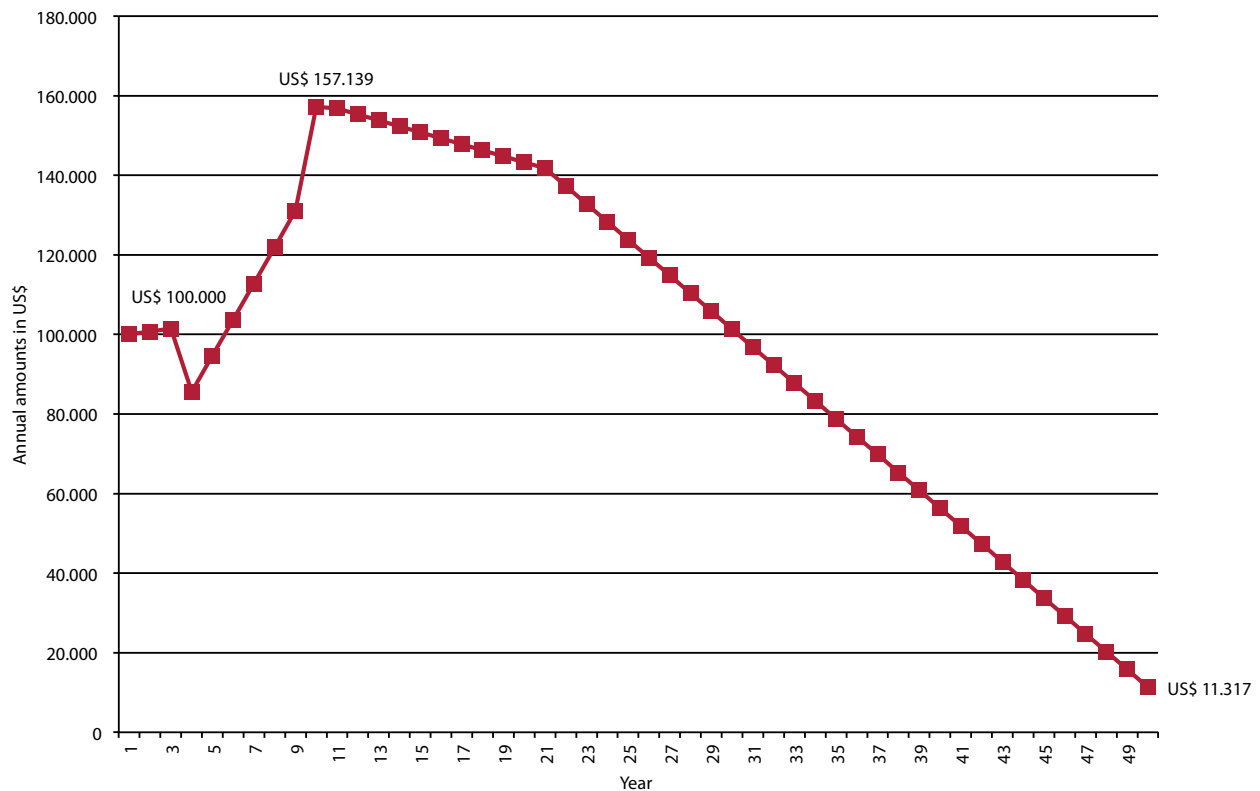
In order to be able to repay both the cost of capital and the original loan (amortisation), in a situation where repayment of principal is required, government would have to plan for the total annual cash flow payments shown in Figure 2.

Facts:

Year start:	2010
Loan duration:	50 years
Payback period:	2020 to 2060
Commitment charge[5]:	0.50%
Interest charge[6]:	0.75%
Total capital loan:	US$ 22,000,000

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5   This percentage is charged yearly on the funds that have not yet been disbursed to the project.

6   This percentage is charged on funds that have been disbursed to the project.

Figure 2. Yearly interest payments and principal repayment
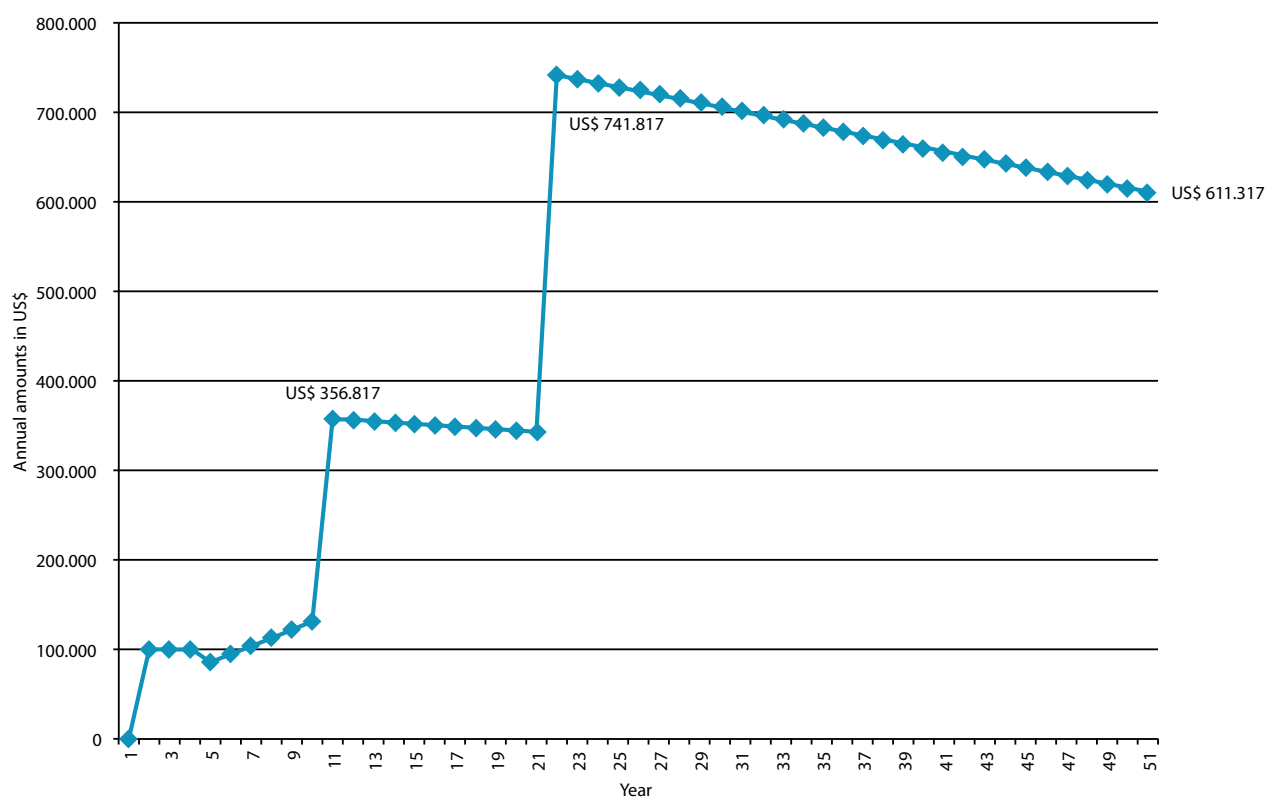
A more conventional loan over 20 years (instead of 50 years) with a five-year grace period and a more cost reflective 5% interest rate, would require higher annual total repayments and interest, peaking at US$ 2,300,000 then declining to about US$ 1,400,000 as a final payment in year 20. This, better matches the lifetime of the assets and also better indicates the actual costs. However this more cost reflective cost of capital, averaging US$ 540,000 per year over a shorter period, requires total interest payments of around US$ 10,750,000.

In the 50 year example, 20 years into the loan agreement (when all project planning has been forgotten and many of the assets have been abandoned), the sector or government would still need to budget US$ 600,000 per year for the following 30 years for repayment of the capital, and around US$ 150,000 (on a declining annual trend) for payment of the interest.

None of the technical interventions in rural contexts have a life span of more than 20 or 30 years. Therefore, the financial burden far surpasses the life span of the structures. The period of finance and the service provided are therefore mismatched. The expectation is that the effects of inflation will reduce the repayment burden relative to the then inflated tax base. In reality, the use of such long life loans is another form of subsidy.

What this shows is that even soft loans with low (subsidised) costs/interest rates (<1%) can lead to significant annual financial expenditure when the overall repayment period and the size of the project are taken into account.

Annex 1: Risk, debt and equity

While the interest rates charged by lenders to governments and the rates charged by national commercial banks can give an initial figure to work with, it can be helpful to develop a fuller understanding of the components that make up the cost of capital, and to understand both the costs of capital of development banks and the costs incurred by the private sector.

We also recognise (See Box 3) that there are different cultural approaches to lending and the cost of capital.

The relationship between risk, debt and equity

The actual cost of capital is best understood to be the level of return at which owners of capital are prepared to lend or invest, relative to the **risk** of being unable to get their money back, and at which those seeking capital are prepared to borrow. If the owners of the capital, such as a private individual, think it is unlikely that they will get their money back, then they will be tempted to hold on to it. However, they face the danger that, because of **inflation** in general prices, their money will lose its value over time. They also face the insecurity of keeping capital where it might be stolen, burnt or eaten by moths. They may prefer to invest it in something they consider safe and will give them a small return over and above the cost of inflation. Similarly the users of capital will only want to pay a cost of capital relative to the value they can obtain from using it, either a financial return or a social return.

Therefore there is a balance needed between what providers of capital might like to receive and what lenders are willing to pay, just as for any transaction. The capital market gives some understanding of accepted costs but the challenge for the water and sanitation sector is the monopolistic nature of service provision. It is not possible to have competitors in networked water supply where each could demonstrate what rates of return on capital they can achieve by their efforts and the value placed on those efforts by customers. Economic regulators have to set target rates of return which are high enough to ensure sustainability and financeability of enhanced services going forward without allowing service providers overly generous returns.

The starting point for understanding an accepted or target cost of capital is the **risk-free rate** which is generally the rate at which governments borrow. Because many people would like their savings to be risk-free, the cost or return is relatively low. If the owners of the capital want a higher return they have to be prepared to accept a higher risk by lending to **non-sovereign guaranteed borrowers**. If they lend for a known period of time at an agreed interest rate with strong confidence of it being repaid even if something goes wrong (i.e. having supporting **security** or **collateral**), then the cost of that loan – the **debt premium** above the risk-free rate – is only a little higher.

Box 3. Islamic Banking

This briefing note describes a classical Western society approach to understanding and using the cost of capital. There is an important and different way of accounting for this cost. The basic principles of Islamic banking include the obligation of the wealthy to help those who are less well off, the sharing of risk, profit and loss, and the prohibition of **riba**. Some see riba as covering only forced or excessive interest (**usury**) while others say it includes all forms of interest payment, whether high or low. Common terms used in Islamic banking include **profit sharing** (Mudharabah), **safekeeping** (Wadiah), **joint venture** (Musharakah), **cost plus** (Murabahah), and **leasing** (Ijarah). The provider of finance must be involved as a partner of some form in the trading activity of the entity which entails genuine risk sharing. This is, at one level, similar to providing equity and anticipating dividends with a fair share of the rewards going to those who provided the expertise as well as those who provided the capital.

Rating risk

The cost of debt capital is related to the perceived risk of it being repaid.

In business, *ratings agencies* grade (rate) the level of risk. Lending money to a government with *sovereign guarantees* is (meant to be) much less risky that lending to a new business starting up – even where the lender has first rights to sell off the borrower's building or stock in order to get their money back if anything goes wrong. The interest rate payable on loans therefore to a sovereign government or development bank rated at *Triple A* (AAA) is less than would have to be paid on loans to a new business, particularly a new business in an emerging economy which might be rated BB or C.

In India some larger municipalities have paid for their operations to be rated which makes it easier for them to borrow money.[7] The World Bank and other multi-lateral Development Banks are also rated as AAA because they are presumed to be protected against any likelihood of default[8] which enables them to borrow very cheaply and so *on-lend* to poorer countries relatively cheaply. We describe it as 'relatively cheaply' because in on-lending they know that there is some risk that lower-income countries might default even on their sovereign loans. *International Finance Institutions* (IFIs) have traditionally protected their capital by only lending to sovereign governments, letting those governments take on the risk of default by any utility or government agency through their own on-lending margin. The IFIs therefore charge a margin on their lending to pay for that risk (like an insurance policy which everyone has to pay to protect against an accident by the few). They also add on to their interest rates an additional margin to pay for running the bank itself, which includes the policy advisers, analysts, project officers, desk officers, evaluators and think-tanks.

The cost of microfinance is often perceived to incur a higher cost of capital because of the greater risk of loan defaults where there may be no security (though the opposite has often been shown to be the case, particularly with female borrowers) and also because of the higher cost of managing many small borrowing transactions.

The cost of debt therefore is the *risk-free rate* (the level at which governments can borrow), plus the *debt premium*, which varies according to the perceived riskiness of the borrower, plus a margin to cover running costs.

The cost of equity

The cost of equity, that is the profits from which the owners receive their dividends as their return on investing their capital, equally depends upon the perceived risks of investing in that activity. However for equity there is no fixed or agreed level of return or cost. The more efficient, the more creative, the harder a business works in the competitive sector – or the greater risks they perhaps take– the higher the level of returns or profits the owners might be able to make. The extent to which profits might depend on avoiding environmental and labour responsibilities is an issue which relates to effective regulation of markets – a challenging issue for all governments.

Ideally, if the market is functioning effectively, the business will only be achieving profits at a level that is commensurate with the services they have delivered and the risks they have taken. The providers of equity take a higher risk than lenders of capital because the providers of loans are normally first in the queue to be repaid if anything goes wrong. In the case of an enterprise failure, there is likely to be little left to repay the equity providers. Equity providers take that risk in order to achieve a higher return.

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7   Further information can be found at: http://en.wikipedia.org/wiki/Bond_credit_rating

8   The World Bank is owned by 186 member countries which enables it to borrow at low interest rates because the loans are backed by the high-income member countries sovereign guarantees.

In a monopolistic water sector where consumers have no alternative and environmental awareness should be at the heart of the enterprise, public or private, there should be relatively limited returns to shareholders. However the argument is made that there have to be sufficient returns, relative to the (more limited) risk involved, if capital is to be attracted to the sector. Therefore the economic regulators of large scale private water providers, use similar approaches to understand the cost of capital in the competitive private sector but with appropriate adjustments. It is helpful for public water providers (or for government departments and economic regulators) to understand this approach in order to decide whether they also need to achieve some level of return to equity as well as to facilitate better allocation of scarce capital resources.

The cost of equity, using what is known as the **Capital Asset Pricing Model** (CAPM), is said to be made up of the **risk-free rate** cost of capital plus an **equity risk premium**. This premium in the quoted private sector is calculated according to how risky the stocks and shares market perceives that business to be – as measured by the **beta factor**, a measure of volatility in the market.

Well managed private utilities in high-income countries, with an economic regulator to set the prices, are perceived to be relatively low risk and should only have a small equity risk premium, once adjusted by the beta factor. However, small scale independent providers in low-income countries might be seen to be much riskier – and therefore seek a higher return for their investment. Formal water providers can remove the business opportunity for an informal piped water system on the edge of a city, by extending the formal pipe network. It can be argued that the owners of those systems will need to get returns on their capital invested in a shorter period, and so need to charge customers a higher cost of capital.

This explanation has taken us into more detail than is required for most of the technologies and services being pro-vided in developing countries. However, it remains particularly relevant to understand the costs of providing for net-worked services to low-income, peri-urban (slum) residents. The costs of ensuring appropriate services to these, often informal and under-served areas, include the cost of delivering bulk water to the edge of the area plus the distribution network and water selling points. There may be additional costs because of the complexities of serving high density areas with very poor drainage and without straight roads to enable pipe-laying. There may also be additional costs of social mediation as well as kiosk and vendor operating costs.

Very often the price of water charged to vendors and kiosks is distorted by the effect of the tariffs which do not reflect the real costs incurred by the utilities to provide water to slums or peri-urban areas. To know the cost of supplying peri-urban areas, and the real costs of providing bulk water, it is necessary to investigate the overall costs of supplying water in that city, made up of a combination of operating expenses, capital maintenance expenses and the cost of capital. What that cost is, whether recognised or unrecognised, can be investigated through the approach described above.

This detailed approach is also relevant to understanding how the finance costs are developed for large rural projects with external development bank funding.

There is much debate about what these components add up to, to give a reasonable, fair, return on capital. A good approximation is to assume a baseline risk-free rate such as a Triple A 'real' cost of capital, 2-3% as of early-2011, lower than pre-2008 due to the credit crunch. The 'debt risk premium' for a company (or country) rated at Triple B might be 2-3% making a total real cost of capital for that borrower of 4-6%, taking into account the management of the loans and the risks of default.

Calculation example of Weighted Average Cost of Capital (WACC)

We have looked at these issues with the effects of inflation removed. If inflation in that country is 5%, the lender will be looking for a nominal interest rate of 9%-11% in order to recover their 'cost of capital'[9] (See Step A of Table 2).

This assumes that a publicly owned service provider is not expected to deliver any return on equity. A realistic 'real' cost of equity for a private provider could be the sum of a 2-3% risk-free rate with an equity risk premium of 5% and a Beta factor of 0.8 which would give a total real cost of equity between 6-7% and 11-12% with 5% inflation included (See Step B of Table 2).

Assuming, for ease of calculation, that the service provider is funded 50% by debt, 50% by shareholder equity then the (nominal) Weighted Average Cost of Capital would be 10-11.5%, averaging the 9-11% costs of debt with the 11-12% cost of equity (See Step C of Table 2). However, the beta factor we used (less than one) is only valid in upper-middle and high-income countries. Experience has shown that the risk of expropriation or early concession demise is much higher in lower-income countries which could lead to nominal weighted average costs of capital at 11.5-13%.

These differences in percentages may not appear to be very large – but when water providers are borrowing tens of millions, as they do in such a capital intensive sector, then the cost of capital servicing begins to be significant – as shown by the example earlier in this briefing note.

There is an additional point to consider where funds have been borrowed from international lenders and that is the risk of devaluation of the currency where the loan is being used relative to the country which has lent the money. In general terms the level of inflation should represent the extent of depreciation of the currency. However, there may well be a **country risk** element added to the cost of the loan to insure against sudden and unexpected devaluations.

In addition to all these costs there is a potential **demand risk**, leading to an additional margin, or insurance as it were, because it is uncertain whether consumers will buy all the services provided. With this in mind, it is possible to see why private power companies charged/expected an 18-20% return on new power generation plants in low-income countries. The companies saw this as seeking a reasonable return on their capital, given the risks. Many observers see it as profiteering: achieving a return beyond a reasonable cost of capital.

Each of the factors we looked at in relation to risk (the rating given to the country, the risk of default, the political risk, the uncertainty of demand) is almost always worse in low-income countries than in richer countries. For this reason, we end up with cost of capital being much higher in countries that most urgently need additional investment, than in countries that can more easily charge consumers the full cost of services including the cost of capital.

This is a major reason for using government supported financing, directly and through the international finance institutions, where they are better placed to manage that risk than commercial lenders.

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9   If inflation was 10% per year, then the nominal cost of capital would be approximately 14-16%. In this example, the nominal rate of interest was calculated simply by adding the real interest rate to the inflation rate. A more accurate technical determination is obtained through the Fisher equation: (1+nominal interest rate)=(1+real interest rate)*(1+inflation rate).

Table 2. **Estimation example of a Weighted Average Cost of Capital (WACC)**

		Range		
		Min	**Max**	
A	Cost of debt	2%	3%	Risk-free rate
		2%	3%	Debt risk premium
	Sum:	4%	6%	Total real cost
	With 5% inflation:	9%	11%	Nominal interest rate for Cost of Capital
B	Cost of equity	2%	3%	Risk-free rate
		4%	4%	Equity risk premium (5% times 0.8 - Beta factor)
	Sum:	6%	7%	Total real cost of equity
	With 5% inflation:	11%	12%	Total real cost of equity with inflation
C	Calculating WACC	9%	11%	Total real cost of debt with inflation (funding 50%)
		11%	12%	Total real cost of equity with inflation (funding 50%)
	Weighted average:	10.0%	11.5%	Weighted Average Cost of Capital