

# »» Integrated Urban Sanitation at Scale

Finance

Approaches supported by  
Financial Cooperation



Published by  
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Frankfurt/Main, August 2013

# Introduction

## Integrated Urban Sanitation

Development cooperation projects in urban sanitation aim to create adequate living conditions, to protect public health and the environment as well as to foster economic and social development. Inappropriately treated sewerage and faeces can pollute drinking water and pose an acute danger for humans and the environment.

Functioning, area-wide sanitation systems still represent an unsolved problem for many developing countries. The poor living in the fast and unregulated growing outskirts of urban agglomerations are effected the most: Often not enough sanitation facilities are available and the existing facilities are not sufficiently maintained and cleaned. Furthermore, the appropriate disposal of faeces in areas that are not connected to sewers was until recently insufficiently organized.

As outlined by the WHO, investments in developing countries in water and sewerage systems are highly beneficial from an economic perspective. However, in practice there is a lack of technical and financial viable solutions.

Current experiences and observations by KfW show the following challenges during design and implementation of sanitation projects:

- In the past, public financing focused mostly on sewer-based sanitation. For this reason, many poor urban areas were neglected due to the high costs involved. More economic on-site sanitation concepts were not systematically considered and were often limited to demonstration latrines related to water supply projects.
- During project planning, the entire sanitation chain was often not considered appropriately. The outcomes were the financing of latrines not integrated into a sanitation concept and the financing of waste water treatment plants without an adequate treatment of fecal sludge in place.
- Hygiene promotion and sanitation marketing were often not properly integrated into sanitation projects, not adjusted to the specific local challenges and not designed to foster verifiable behavioral change. Unprofessional information campaigns had frequently little impact.
- Economies of scale and potential for scaling up were often not sufficiently exploited due to the application of diverse technologies in the jurisdiction of an operator and due to the fragmented and unclear institutional responsibilities.

Future sanitation interventions in peri-urban areas should therefore more strongly focus on integrated sanitation concepts connecting sanitation chains from an institutional, technical and financial perspective in order to allow for adequate sanitation with affordable capital and operational costs.

Different districts with different population densities and infrastructures have to be provided with different sewer and non-sewer based on-site and off-site concepts. The respective sanitation chains have to be carefully planned and organized up to the final products to avoid health and environmental hazards.

A sustainable improvement of sanitation in poor urban areas is only possible, if the following crucial aspects are considered along the sanitation chain and are adapted to the specific local conditions:

- Differentiated technical solutions
- Regulated institutional responsibilities
- Cost-covering models for operations and financing
- Evidence-based hygiene promotion

Integrated sanitation in this publication does neither refer to vertical or horizontal integration of utilities, nor the integration of waste management related aspects into sanitation systems.

This trilogy of working papers covers the topics of technology, finance and hygiene and gives specific recommendations for the integration of non-sewer-based sanitation in urban sanitation systems as well as recommendations for the conceptual and institutional design of hygiene promotion.

The three working papers build on each other and give an introduction into the respective topics, providing further information and relevant practical knowledge in the respective annexes. The following aspects are addressed:

- TECHNOLOGY: definitions, basic information, planning, operation and design alternatives.
- FINANCING: institutional aspects, market failures, financing instruments and economic assessment.
- HYGIENE PROMOTION: basic information, behavioral change, programme design and institutional set-up.

The working papers address practitioners and project managers in development cooperation and purposely do not choose a scientific representation of content. Selective reading is recommended.

# Financial Aspects of Integrated Urban Sanitation

Competence Center Water and Waste Management

KfW Sanitation Task Force 2013

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1	<b>Goal and principles of financing integrated sanitation</b> .....	4
1.1	Purpose and structure of the working paper .....	4
1.2	Basic principles of financing integrated sanitation.....	4
2	<b>The institutional context of integrated sanitation</b> .....	5
2.1	Involving all relevant actors .....	5
2.2	Responsibilities and interfaces .....	5
2.3	Regulation and legal enforcement .....	6
2.4	Tariff systems and pricing.....	6
3	<b>Market segments and market failures in integrated sanitation</b> .....	7
3.1	The market segment “toilets and latrines” .....	7
3.2	The market segment “emptying and transport” .....	7
3.3	The market segment “treatment” .....	8
4	<b>Financing instruments for integrated sanitation products</b> .....	8
4.1	Traditional grants and loans for the end user and/or operator.....	9
4.2	Microloans and SME loans .....	9
4.3	Community-based and revolving funds for sanitation.....	10
4.4	Output-based financing .....	10
4.5	Subsidies.....	11
4.6	Private sector involvement.....	12
5	<b>Economic assessment of integrated sanitation projects</b> .....	13
5.1	Calculating the reference quantity .....	13
5.2	Separating the individual components and assigning overheads .....	13
5.3	Dynamic prime costs, and assessment of the recoverable amounts.....	14
5.4	Cash flow analysis for the operator – grant requirement.....	14
5.5	Financing plans for integrated sanitation projects .....	14
5.6	Challenges when assessing integrated sanitation projects .....	15
Annex 1:	Actors along the sanitation chain .....	17
Annex 2:	Practical information along the sanitation chain .....	18
Annex 3:	Cost categories for integrated sanitation.....	20

References

# 1 Goal and principles of financing integrated sanitation

## 1.1 Purpose and structure of the working paper

The **goal** of development cooperation in this context is to create technically and financially sustainable sanitation systems to improve the health and environmental situation of the target group. The focus is on integrated solutions that cover the entire urban area, include both local and central installations, and reach inhabitants currently unserved.

The present working paper has been designed as a **practical tool** for use in German financial cooperation. It deals in particular with appropriate financing mechanisms for sustainably improving access to, operation of, and removal of material from, urban sanitation systems not served by a sewer.

The **content** of the paper is **structured** on the basis of a description of the institutional context and the market segments of integrated sanitation, and discusses the public sector and market failures often encountered in developing countries. The paper then describes in detail the possible financing instruments for eliminating market inefficiencies, before concluding with pointers on the economic assessment of integrated sanitation projects, and practical recommendations.

## 1.2 Basic principles of financing integrated sanitation

Activities and interventions in urban sanitation should always be based on a **single planning framework that is binding for all actors**. This should take the form of a sanitation master plan, which in turn should be based on an urban development plan. Within this framework, wherever possible “non-sewer-based” sanitation in an urban zone should always be viewed in an integrated context together with sewer-based sanitation and water supply. If basic documents of this kind are not available, then at least basic elements thereof should be developed when preparing a feasibility study.

As well as a single planning framework, it is also crucial to aim for a **single framework of organisational responsibility** for sanitation in an urban zone. This will facilitate efficient decision-making structures.

From the operator’s perspective it is important to aim for the most **uniform technical solution** possible, in order to leverage synergies and economies of scale along the sanitation chain. To ensure compliance with the standards set out in the technological design, only those technologies envisaged and defined in the master plan (household connections, latrines) for the end user should be financed. This also applies to emptying equipment, transport equipment, and the treatment of feces, urine and other products.

In principle, financing for sanitation projects must always cover the entire sanitation chain, from the latrine to final disposal. Only latrines with a downstream disposal concept, i.e. on-site or off-site disposal in the case of non-sewer-based systems, should be financed.

Increasing and **mobilising demand** for sanitation installations plays a key role. To achieve this, end users often require financial support. In the past, small-scale pilot projects and demonstration latrines, as well as awareness raising achieved through sanitation marketing programmes, have failed to help significantly increase demand.

Financing should be provided for **investment costs**, not operating costs. Operating and running costs for maintenance and emptying should be donor-financed only in exceptional cases, for a limited period and where there is a special link to poverty. Otherwise objectives cannot be achieved sustainably.

## 2. The institutional context of integrated sanitation

Sanitation projects always take place in a **context** that involves (i) households, (ii) local communities, (iii) central institutions such as governments, regulatory authorities etc. and (iv) in many cases also commercially oriented operators. Sanitation chains can only work if all actors are successfully linked up and coordinated.

The key **actors** are (i) ministries and other institutions at the level of the nation state, (ii) regional and local administrative units, (iii) municipalities, (iv) operators of emptying services, the sewer system, and purification and treatment plants, (v) construction companies and trades, (vi) regulatory authorities, (vii) NGOs and community-based organisations, (viii) commercial and industrial customers, (ix) public and institutional customers, and (x) households and other private customers. A detailed list and practical pointers are provided in Annex 1.

In development cooperation **borrowers, project executing agencies and operators** of sewer-based projects are usually a state-owned water/sanitation utility, municipal authorities, (development) banks, local/regional authorities or the state itself. With non-sewer-based off-site sanitation systems the sanitation chain may also include other actors such as private operators and service providers (transport/emptying) and end users (household connections/latrines). These actors are financed through one of the aforementioned intermediaries, or are involved in the tendering procedures.

The key institutional **challenges** are described below.

### 2.1 Involving all relevant actors

Municipal operators in developing countries are often responsible for sewer-based sanitation systems only. However, in urban sanitation projects it is desirable to work with a **single agency** that is responsible for organising the entire sanitation chain, and where necessary also water supply, for an entire urban zone. The agency should integrate different solutions that are appropriate to varying local circumstances. Ideally, this responsibility should also extend to stimulating private latrine construction, hygiene education and monitoring of public latrine operation. Components can be outsourced, e.g. to small private enterprises, and this is often appropriate (e.g. KfW – Burundi 2005).

If the institutional environment is not conducive to making a single agency responsible, then all actors along the sanitation chain should be involved on an equal footing. In practice, there is often at least one public utility that is organisationally separate from the municipality. When designing the project, all **stakeholders** should be systematically identified at the earliest possible stage. In any case it remains vital to involve the national agency for managing and delivering the financing, and coordinating the various actors.

### 2.2 Responsibilities and interfaces

The tendency toward **decentralisation** of responsibility for basic public needs in many countries has created an institutional vacuum. This also affects sanitation and hygiene promotion, which means that clearly designated responsibilities and transparent rules and regulations for involving the private sector along the sanitation chain tend to be lacking.

The various state actors have cross-cutting **roles and responsibilities** at the level of the nation state (e.g. ministry of health), at the level of specific sectors (e.g. ministry of education for schools) and at the territorial level (e.g. regional and local authorities).

Problematic aspects usually include a lack of **resources** and capacities. Moreover, the absence of designated responsibility often leads to considerable risks for sustainability. Here it may be necessary to improve the availability of resources and support institutional capacity building for

the project executing agency, and include relevant provisions in implementation agreements with that agency.

However, the only way to define **interfaces** between institutional and commercial actors is to create clear **responsibilities** and divisions of labour between the various actors along the sanitation chain. This point requires close attention.

Implementation agreements should also include provisions for **involving the private sector or NGOs** in the delivery of certain services such as the construction of toilets, the operation of public toilets, the transport of feces/fecal sludge, the operation of treatment plants and the implementation of hygiene measures and sanitation promotion. These should be monitored by the project executing agency.

When taking decisions on appropriate sanitation and the operation thereof, it is always necessary to take account of the specific **land tenure rights**. In peri-urban zones in particular, clear provisions governing these rights are often lacking. This problem is further compounded by the high degree of fluctuation within the slum population, as well as speculation in land with improved sanitation infrastructure. These factors cause a lack of interest in sustainable solutions, and lower the willingness of private users to invest (e.g. KfW – Uganda 2007).

### 2.3 Regulation and legal enforcement

Efficient coordination and management requires the introduction of strict **regulation** and legal standards, and the creation of an incentive and monitoring system. To ensure compliance with these regulations and standards it is necessary to create effective and efficient means and structures for legal enforcement, including especially disposal obligations, hygiene standards etc. These provisions will concern inter alia (i) ownership structures, (ii) rights of way, (iii) deposition regulations, (iv) licences, (v) fees and tariffs and (vi) hygiene regulations, and will apply to both the proprietors and **operators** of private, public and communal toilets, as well as actors along the sanitation chain such as emptying services and landfill operators.

Similarly, licenses for the operation of public toilets must also be tied to compliance with standards. For institutional toilets too we recommend regular monitoring mechanisms. Along the sanitation chain the granting of licences, procedures and **cash flows** must also be managed such that the inappropriate emptying and treatment of fecal matter is prevented wherever possible.

### 2.4 Tariff systems and pricing

The direct funding of services along the sanitation chain by the end user or household often presents a challenge due to a **lack of willingness to pay**, and poverty. The model that has usually been employed to date of having households pay a service provider directly to remove feces from on-site installations is not one that we recommend. This is because in poor districts households are barely able and/or willing to pay for this service, which means there can be no guarantee that the material will be disposed of.

The objective is to introduce organised models for financially integrated water supply and sanitation that for instance allow alternative **options** such as: (i) cross-financing through the wastewater tariff, (ii) financing through the water tariff, possibly also including households with no wastewater connection, (iii) the raising of a corresponding tax, e.g. on real estate, and (iv) the raising of a levy via other tariffs, such as electricity or mobile telephones. Grants may be used in cases where there is no other way of generating a positive cash flow for the service provider, where performance cannot be increased and where users themselves are otherwise unable to pay for the service. In such cases it is important to ensure that efficiency incentives are not undermined, and that where possible use is made of contribution margins from the sale of products.



### 3. Market segments and market failures in integrated sanitation

Sanitation chains can be broken down into various market segments, within which different market mechanisms come into play. The prevailing market mechanisms in sanitation often send distorted signals to the market players, which leads to a suboptimal allocation of resources. This is what we term **market failure**. Market failure occurs both on the demand and on the supply side, and encompasses all market segments along the sanitation chain. The task of development cooperation is to support the elimination of these market failures. In this context, we consider the systematic analysis of market failure used by Tremolet (2012) to be an appropriate way to present this. Section 3 of the present paper is therefore based on that publication.

#### 3.1 The market segment “toilets and latrines”

We can draw a basic distinction between the **sub-segments** i) communal toilets on private land, ii) public and institutional toilets, and iii) sewer-based household connections and on-site installations on private land.

There is usually no mass demand for toilets and latrines at going market rates. This demand has to be generated and satisfied using appropriate **financing instruments**. In the “private toilets” sub-segment the end customer is usually obliged to ensure proper emptying of the latrine, and to finance this. In reality, however, this takes place only rarely, one reason for which is that the procurement or improvement of latrines represents a considerable financial hurdle, especially for poor end users. Further reasons for market failure on the demand side include (i) lack of awareness among end users, (ii) lack of willingness or ability to pay for an emptying service, and (iii) inadequate availability of appropriate services.

On the **supply side**, factors causing market failure include e.g. the lack of qualified, motivated and properly equipped service providers such as masons; suboptimal institutional and organisational environments; disinterested monopolists, and a lack of legal certainty for private service providers.

Demand	Supply
<ul style="list-style-type: none"> <li>• weak demand or none at all</li> <li>• poor knowledge of the benefits of sanitation</li> <li>• resistance to behavioural change</li> <li>• high costs</li> <li>• lack of willingness and ability to pay</li> <li>• lack of appropriate funding mechanisms</li> <li>• fragmented process, high transaction costs</li> </ul>	<ul style="list-style-type: none"> <li>• weak supply of service providers (e.g. masons)</li> <li>• inadequate knowledge and equipment among existing service providers</li> <li>• lack of legal status for existing service providers</li> <li>• existing monopolistic structures prevent the emergence of alternative service providers</li> <li>• no fee system</li> </ul>

#### 3.2 The market segment “emptying and transport”

The main obstacle to the generation of the needed **demand** is the lack of willingness among end users to pay for emptying out and transport, plus the excessive costs that are often beyond the means of poor groups.

Obstacles to delivery of professional services on the **supply side** are the lack of engineering strategies and lack of investment. The low willingness to pay often means that the liquidity needed by the operator is not guaranteed. The key market failures are:

Demand	Supply
<ul style="list-style-type: none"> <li>• low willingness to pay</li> <li>• prohibitive costs</li> </ul>	<ul style="list-style-type: none"> <li>• lack of capacities for emptying and transport</li> <li>• lack of technical and institutional strategies and solutions</li> <li>• low profitability</li> </ul>

### 3.3 The market segment “treatment”

On the **demand side** the usual cash flows create a certain incentive to forego treatment and evade regulations. For example, the practice of emptying services depositing their load at the treatment plant and paying for doing so, leads to illegal deposition at non-designated sites. This incentive can be reduced considerably by structuring the cash flows differently, i.e. by ensuring that emptying providers are not paid for their services until they deposit treated matter.

On the **supply side** disinterested monopolists, a lack of technical strategies and solutions, and in many cases low profitability are responsible for the poor market supply.

Demand	Supply
<ul style="list-style-type: none"> <li>• low willingness to pay</li> <li>• prohibitive costs</li> <li>• lack of supervision</li> </ul>	<ul style="list-style-type: none"> <li>• lack of treatment capacities</li> <li>• disinterested monopolists</li> <li>• lack of technical and institutional strategies and solutions</li> <li>• poor leverage, low profitability</li> <li>• lack of investment capital</li> </ul>

In some case, properly treated and processed end products can be profitably recycled. They are used as agricultural fertilisers. Although **recycling** (urine, compost) can play an important role, we will not describe the various product markets in detail at this point.

Financing strategies only succeed when they aim to **eliminate market failures in all market segments**. Demand side market failures can for instance be influenced through bespoke sanitation marketing campaigns in conjunction with subsidised microcredit products or consumer loans. Demand for emptying services can be increased through appropriate pricing models and terms of payment, possibly in conjunction with increased efforts to enforce the relevant standards. On the supply side the use of subsidised output-based instruments should be considered. Other approaches include the financing of suction vehicles, which is designed to mobilise private services, and the financing of appropriate sludge treatment facilities.

## 4. Financing instruments for integrated sanitation products

A number of financing instruments are available that are suitable for correcting the above-mentioned market failures. However, internationally there have **so far been only few successful financing approaches for broad-based, integrated sanitation projects** that include both sewer-based and non-sewer-based sanitation, and in some cases also water supply and solid waste management. One such example is Durban in South Africa (Schuen, 2009). Experiences to date with non-sewer-based sanitation have usually focused on pilot projects, as for example in Ouagadougou, Burkina Faso (Schuen, 2009). The list of possible financing instruments given below should therefore be seen only as a **guiding framework for possible designs**, which might become more significant in the future. The traditional financing instruments also remain relevant. More recent approaches are described below.

#### 4.1 Traditional grants and loans for the end user and/or operator

In the market segment “toilets and latrines”, **grants** for end users have usually been used, though these have been limited to the critical sections of the sanitation concept. The remaining portion has been provided by the end user and/or operator in the form of construction inputs, land, financial participation etc.

In the market segments “transport and treatment”, funds have been provided to public operators or the national executing agency using the **traditional financing instruments** such as grants and loans, usually to finance sewers, clarification plants and sewage sludge treatment capacities.

#### 4.2 Microloans and SME loans

In their original form, **microloans** are designed to finance small business activities. The volumes of funding are significantly smaller than is the case with traditional loans. The repayment arrangements usually include provision for generation of an additional cash flow from a business activity. This is not the case with private toilets and latrines, though it is the case with landlord toilets, where the upgrading of properties often means that higher rents can be generated (e.g. KfW – Kampala).

To date only very **few microfinance institutions** have developed specific products for water and sanitation like those of the Grameen Bank and Vietnam Bank for Social Policy (VBSP), for instance (Metha, 2008). In many cases the terms for borrowers are comparatively strict, as a result of which poorer households in particular are unable to benefit from them. Appropriate microcredit programmes should be developed together with a local institution that can be refinanced.

**Product segments** that would be conceivable include **small loans for households** (up to approx. EUR 5,000) to finance household connections, private latrines and communal toilets in the “toilets and latrines” market segment. The relative significance of these loans remains low; with all the major MFIs they account for less than 2% of the total portfolio, with figures of 1.8% for VPSP in 2007, and 1.6 for Grameen Bank in 1998 (Metha, 2008). The number of customers is growing, however, and potential in the sanitation sector is huge. To facilitate further growth it would for instance be helpful to combine appropriate microfinance products with sanitation marketing activities in order to mobilise demand. Supporting guarantees for the local institution can also lower the demands placed on borrowers, though these should be examined carefully.

Further conceivable options include **loans for private service providers and operators** for investment in the market segment “emptying and transport” and for toilet operators. Loans of this kind have so far only been piloted. Experiences have been promising e.g. in Kenya, where a private bank supported by the World Bank Water and Sanitation Program (WSP) has been extending loans of this kind (Metha, 2008). Affordability for borrowers and end users can be increased by adding subsidy and/or grant components. The borrowers are small enterprises that deliver services along the sanitation chain. Elements that are critical to the success of measures include the management capacities and capabilities of the operator and the service providers, and their creditworthiness.

The lessons learned with microcredit to date permit the following **conclusions**:

- With microloans for **households** we urgently recommend giving the IFIs a lead role for specific product development, and linking this with sanitation marketing activities.
- With small **SME** loans we recommend looking into the possibility of adding grants and guarantees. Accompanying marketing and training campaigns should also be considered.
- **Combining loans and grants** can increase the feasibility of a project. Loans for service upgrading and communal toilets, especially in poor districts, should be supplemented with grants from public funds.

- At the **policymaking and planning level** it is important to focus on the problem of land tenure, in order to create legal and planning certainty. Activities to address this problem exist e.g. in Ghana, where a Community Based Organisation (CBO) is conducting corresponding negotiations with the municipality on behalf of citizens (Sijbesma, 2011).

### 4.3 Community-based and revolving funds for sanitation

Funds of this kind aggregate mainly **contributions from various actors** such as private individuals, local governments, NGOs and donors, and lend these monies primarily to private individuals in the “toilets and latrines” market segment. In principle, funds may be local, regional, national or international in structure. The higher the proportion of the money provided by the local population, the more strongly they identify with the fund. Some funds also operate on an interest-free basis.

A further critical element is the **legal status** of the fund. It must be guaranteed that the relationships between the fund, its financiers and the borrowers are governed by clear rules, and that these rules apply equally to all.

The **initial endowment** is often provided by donors. This means that the monies that can be disbursed are limited. Further amounts can only be paid out once former borrowers have made corresponding repayments. Where funds are based within the local community, this can often also generate informal pressure to pay back loans. This prevents situations arising where an applicant does not receive a loan because his predecessor has not made the repayments due. Continuous support should therefore be provided to ensure that the funds do actually revolve, and are not brought to a standstill once the initial endowment is exhausted. Positive examples can be found in Lesotho – the Lesotho Low-Cost Sanitation Programme, and Viet Nam – DANIDA, FINNIDA – the Vietnam Women’s Union. Negative examples can be found e.g. in India – the Housing and Urban Development Corporation of India (Sijbesma, 2011).

Community-based and/or revolving funds require considerable capacities and inputs for management and administration. Also required are close contacts to borrowers and investors, and detailed local knowledge of management issues. Management and administration must always be performed by **competent personnel**.

**Accompanying marketing** activities etc. are essential, and must also be promoted.

**Results-based monitoring** can only take place after several years, once it can be determined whether repayment rates and the circulation of the capital employed are satisfactory.

### 4.4 Output-based financing

So far, few **experiences** are available in the sanitation sector with output-based aid (OBA), output-based finance, results-based financing, cash on delivery or similar approaches. A large number of similar terms are partly being used synonymously. First approaches of this kind are already being pursued in Morocco and in Senegal by GPOBA (Tremolet, 2010).

The purpose of output-based finance is to design market incentives for the provision of Outputs, Outcomes and Impacts in a way that existing market failures can be corrected. The key aspect involves assigning the **performance risk** for delivery of service to a private enterprise, which then receives a remuneration supplemented by subsidies as an incentive to successfully delivering the services in question. This presupposes that the investment costs are paid in advance by the operator until the agreed service is delivered. The operator thus has a vested interest in delivering the agreed service. Financing approaches of this kind are conceivable in all market segments.

In cases where the operator **makes payments in advance**, the costs of the household connection or latrine for example are settled by the end user in instalments through surcharges added to the rates. The end user is therefore relieved of having to pay the whole amount in a single payment. However, this presupposes that the operator has the financial capacity to pay for the household

connections or latrines in advance, and that debts can be collected regularly from the end client. With non-sewer-based systems with irregular emptying intervals the latter is not guaranteed. It may be possible to alleviate this through appropriate pricing and by managing cash flows such that the emptying of the latrine is also paid for e.g. with the water rate.

A further key aspect of output-based financing is the **involvement of private enterprises**, which is designed to increase operating efficiency, transfer risks and mobilise additional capital. Here it is important to ensure that the financial capability of the operator is sufficient to enable that operator to partially or fully finance the latrine and the household connection in advance.

**Examples** of OBA mechanisms in segments of the sanitation chain include payments to households for the installation and proper use of a latrine, or payments to emptying services for proper delivery of fecal matter to the treatment plant (Morocco, WSUP, 2012).

The **measurement costs** for determining the extent to which objectives have been achieved must be included when calculating the costs. These measurements should be performed by a neutral body, such as a monitoring consultant. It is important not only to monitor the service to be delivered by the provider, but also to measure the performance of the public partner institution.

It is also important not to view the service to be delivered in isolation. Here too we need to include the entire sanitation chain. Otherwise there is a **risk** of creating false incentives. For instance, many toilets might be built in order to obtain the output-based financing, without any guarantee that disposal actually takes place, because this was not included in the service contract.

#### 4.5 Subsidies

Subsidies are often a prerequisite for **generating** an initial **demand** for, and supply of, services. The knock-on effects of subsidies, such as increased demand or the mobilisation of additional funds by households, must also be considered.

Basically it makes sense to boost the supply of **financing at going market rates** by providing loans in all segments of the supply chain, provided that this does not cause any deadweight loss effects, in order to reduce the overall burden and facilitate a sound distribution of payments.

However, in order to ensure sustainability of the sanitation system, components of the sanitation chain should only be **subsidised** once all possible contributions by the actors concerned have been explored and taken into account. Specifically, both monetary contributions (including tariffs) and non-monetary contributions should be required from public agencies, private operators and end users, according to their financial means. This will also increase commitment and ownership. For German development cooperation the directives contained in the BMZ strategy paper apply (BMZ, 2006).

In donor-financed projects, with **sewer-based sanitation** the subsidised financing of private toilets and bathrooms should be avoided. However, it is often right to finance household connections in order to push through compulsory connection, provided that this makes economic sense as part of the overall concept, and is necessary to ensure disposal. A partial subsidisation of off-site disposal solutions is usually an appropriate option in view of the public interest.

With regard to **non-sewer-based components**, in exceptional cases the subsidisation of private sanitation installations (e.g. latrine buildings) can be considered. Given the costs for transport and treatment that are avoided in the case of on-site solutions, it is warranted to provide grants to finance latrine foundations, standardised holding facilities and covering slabs, in order to establish technical standards and generate corresponding demand.

With **communal toilets** on private land (landlord toilets), subsidising an improved sanitation installation raises the value of the rented property, and often enables the landlord to secure higher rents. Full subsidisation is therefore economically unwarranted, unless the technology desired by the operator cannot be otherwise achieved.

**Public toilets** in public places should be promoted on behalf of the municipality or another public agency which will then lease them to competent operators or license them out. The operator should finance maintenance and cleanliness through user fees, and ensure compliance along the sanitation chain. An approach of this kind is being practised for instance in Indian cities (WSP, 2007). The duty of supervision with regard to compliance with the relevant stipulations normally rests with the municipality. Subsidisation is possible, subject to a sustainable operating plan.

#### 4.6 Private sector involvement

The **involvement of the private sector** is not per se a form of financing. In the context of official development cooperation it requires the involvement of intermediaries such as the state, banks and public utilities etc. German Financial Cooperation uses the term “public-private partnerships (PPP)” to refer to various forms of cooperation with private actors that go beyond purely contractual relationships. Under these arrangements the private actor assumes risk, e.g. through private operational management or private capital participation, with the aim of achieving improved and more efficient performance of public tasks.

The **private sector** can conceivably be involved in principle along the entire sanitation chain. With respect to the **market segments** toilets and latrines, various operator structures are common. Private latrines are often operated by households or landlords, while public toilets are operated by public or private operators. Institutional toilets in schools etc. are usually operated by public agencies. Private sector participation is also conceivable, and in some cases already widespread, in the **market segments** emptying and transport (private entrepreneurs), and treatment, in the form of traditional PPP models for fecal sludge/fecal matter treatment.

With PPPs it is always necessary to **reconcile divergent interests** between public objectives, which include affordability for the end customer and quality of service, and the private operator’s interest in making a profit. In this context it is important to create moderate but attractive business and **income-generating opportunities** for the private sector – whether it be through tariffs/user fees, or subsidies. When the private sector is involved this always places **high demands on the public institutions involved**.

A basic distinction is drawn between the following **forms** of private sector involvement:

Service contract	Private partners assume responsibility for clearly defined services such as the construction and emptying of latrines. The duration of the agreement is up to three years.
Management contract	The private partner is responsible for management and operation, e.g. in sewer cleaning. With management contracts the remuneration can be tied to specific target results. The duration of the agreement is up to 5 years.
Leasing contract	The private partner assumes responsibility for operation, upkeep and maintenance. The core components of leasing are payment of a certain fee by the private partner, and that partner’s entitlement to the revenues generated. Such arrangements are usually selected with large-scale urban sewer systems. Leases are granted for up to 15 years.
BOT (Build-Operate-Transfer)	A plant (e.g. a treatment plant) is financed, built and operated by private actors, before being transferred to public ownership (traditional solution).
Concession	A private enterprise is solely responsible for operation, and for investment in rehabilitation and expansion, in a defined area, e.g. public toilets. Concessions are granted for up to 20 years.

In the future we should consider increasing participation by the private sector, especially through **service contracts**, e.g. for the construction and/or emptying of latrines as well as **BOT models** for building and operating public, commercially operated toilets. BOT models are already being

implemented in Indian cities. Here, private actors are building and operating public toilets on their own account. The prices are regulated. Additional income can be generated by renting out advertising space on the private buildings (WSP 2007).

When **involving private enterprises** in the sanitation sector the following points must be observed:

- The needed **capacities** must be in place, or developed through accompanying measures, for all actors involved in the partnership along the entire sanitation chain.
- The drafting of contracts and agreements must include the entire **sanitation chain**.
- The increased **regulatory input** entailed by greater private sector participation must be taken account of.
- **Public authorities** must be supported and trained in setting hygiene standards, fee models, contractual requirements, procurement and contracting procedures.
- **Private enterprises** also require capacity development and market development, especially where a service is being transferred by the state to private actors for the first time.
- Partners must have a stable and predictable **cash flow**.
- **General terms and conditions** must be clearly and unequivocally defined, and both sides must be familiar with their respective rights and obligations.
- Tendering and market-based **award procedures** are a key prerequisite for the delivery of cost-efficient services by the private enterprise.
- Contract awards must be **transparent**, and depending on their order of magnitude must be implemented in accordance with international or national standards.

## 5. Economic assessment of integrated sanitation projects

For the non-sewer-based part of any integrated sanitation project, the following specific features will arise that affect the economic assessment when comparing alternative options and calculating profitability. We recommend following the **sequence of steps** listed below:

### 5.1 Calculating the reference quantity

**Depending on the project**, there are two options for selecting the reference quantity: (i) population served per capita and/or (ii) unit costs per m<sup>3</sup> or t of fecal matter disposed of. This means that:

- It is necessary to **forecast** as precisely as possible the degree of connection and population served, and the quantity of fecal matter resulting from that.
- With sewer-based sanitation, which is usually calculated in terms of **volumes**, it may be appropriate to convert this into costs per capita by taking a standardised per capita water consumption rate.

### 5.2 Separating the individual components and assigning overheads

The investment and operating costs need to be calculated on a **yearly basis** for the individual components of the sanitation chain. Overheads must be allocated proportionately. For treatment plants and sewer systems the established procedures can be used (e.g. allocation of overheads in relation to number of employees at the treatment plant/sewer system). For the non-sewer-based sanitation chain it is necessary to obtain figures for the number of latrines, their frequency of emptying and distance to site of treatment/final transfer. These figures are needed in order to calculate

- the CAPEX and OPEX for the suction vehicles and other transport vehicles and, depending on the technical solution selected, for the holding tanks or e.g. receiving stations in the sewer system, and

- the treatment capacity for feces/fecal sludge at the treatment plant or other treatment stations.

The costs for components that cannot be allocated separately should also be broken down proportionately. A list is provided in Annex 2. Examples include:

- A treatment plant is used both to purify sewage and to treat fecal sludge.
- A sewer system receives not only waste water, but also loads delivered by suction vehicles.
- Consulting costs, accompanying measures such as hygiene campaigns, etc.

### 5.3 Dynamic prime costs, and assessment of the recoverable amounts

The **dynamic prime costs** need to be calculated, as this is the basis on which different options will be compared and cost recovery through tariffs and fees will be calculated. The dynamic prime costs are calculated for the CAPEX and OPEX (per capita and/or unit of quantity) for the individual components, and for the system as a whole, using the familiar methodology. Various figures should be calculated for the discount rate, which will generally be 5%. It is important to take into account the reinvestment needed, especially for latrines and suction vehicles, whose service life usually falls far short of the 20 to 30-year period under consideration.

In accordance with the BMZ strategy paper (BMZ, 2006), all projects should in principle aspire to achieve **full cost recovery** by generating revenues from user contributions. In certain cases, and for certain user groups, it is possible to deviate from this principle. Therefore, in exceptional cases state subsidies to recover operating costs are also possible.

### 5.4 Cash flow analysis for the operator – grant requirement

Performing the **cash flow** analysis involves calculating all the operator's monetary inflows and outflows (income, operating costs, reinvestment etc.). Non-monetary costs such as depreciation are not included.

The cash flow analysis for the operator/executing agency provides a basis for calculating the **grant requirement**, given the anticipated costs and income from user contributions. Existing grants (e.g. for CAPEX) are included in the analysis from the outset. Any negative cash flows can thus be offset by (further) grants. With reference to the BMZ strategy paper (BMZ, 2006), this may also apply to negative cash flows from operational business. Operating costs, overheads and reinvestment costs must be included.

Where there are **several executing agencies** or operators these costs should be allocated to the components of the sanitation chain. A grant for operating costs should be focused on a single executing agency/operator, i.e. the others have the full costs of their services reimbursed. Currently, in German development cooperation, for formal reasons a procedure of this kind is only possible in specific exceptional cases.

Where there are various technical options the sequence of analytical step described (5.1-5.6) should be applied to **all options** as part of a **comparative calculation**. The options will be identified in the technical analysis.

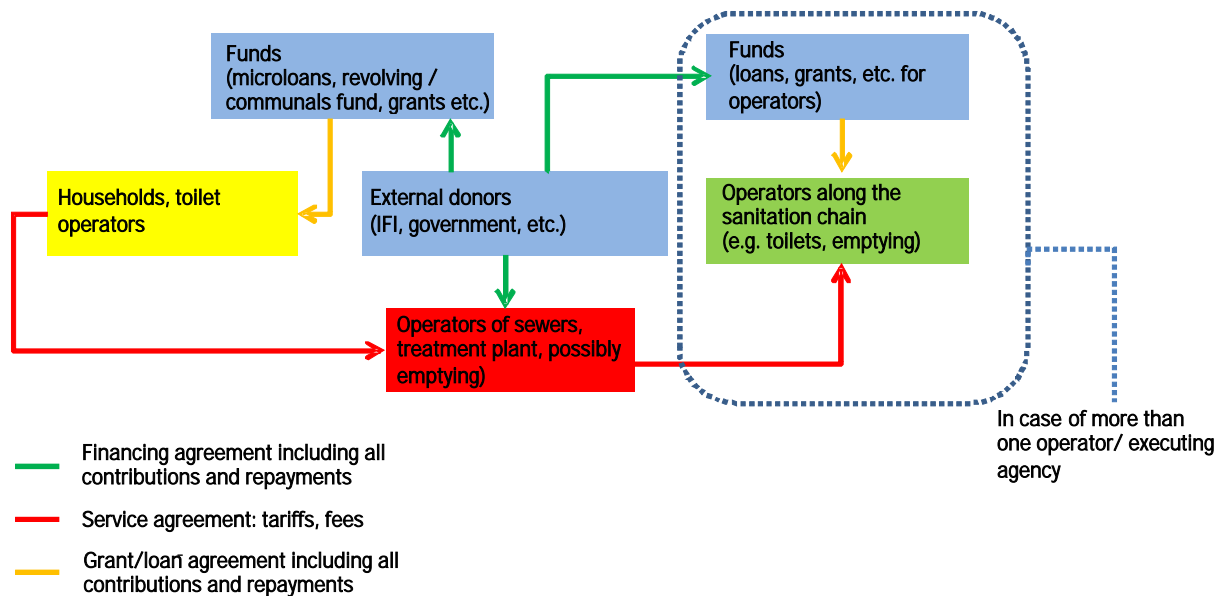
To assess the grant requirement, the recoverable amounts should be calculated in relation to the collection rate of the executing agency, the target group's **willingness to pay** and the reasonableness of the costs they face.

### 5.5 Financing plans for integrated sanitation projects

A financing plan must be drawn up depicting the contractual and financial relationships between the various actors, and showing the grants for the operator and the users, and the user contributions.



A **financing plan** must include all actors along the sanitation chain and cover all market segments. Both public and private sector actors may be present in the various market segments. The graphic below illustrates by way of example the key **contractual relationships** between the actors and the **cash flows** which result from that.



The **financing criteria** for selecting the investments to be financed at the operator, household or municipal level are of a technical, geographic and socio-economic nature, and take into account the performance capacities of operators and partners. For instance, provisions will be included to the effect that only certain technical latrine components will be financed in the area to which the sanitation strategy refers, and that no grants will be provided for profit-oriented toilet operators.

**Cash flows** along the sanitation chain must be designed in a way that creates incentives and is user-friendly. For example, if a water connection is present the client may “buy” the right to have the latrine emptied by paying the water tariff. In return for that he receives a voucher which he then hands over to the emptying service when the latrine is emptied. The emptying service is eventually paid by the treatment plant upon delivery of the load and presentation of the voucher.

## 5.6 Challenges when assessing integrated sanitation projects

Please note the following points when assessing integrated sanitation projects:

- A **microeconomic analysis** only makes sense for specific, commercially oriented elements or operators along the sanitation chain. Sanitation projects often do not have any direct monetary effects on the operator, but do affect households (e.g. investment in the toilet or operating costs). With institutional toilets (e.g. schools) this phenomenon is even more pronounced. Public (e.g. institutional) toilets may also be tied to a further agency, i.e. not necessarily the sanitation operator. For this reason it may prove difficult to calculate the FIRR.
- Identifying/measuring the **fee base** is often complicated, especially in the case of systems not linked to the water supply, i.e. on-site disposal or non-sewer-based off-site disposal, and where there is no household water supply.
- Common approaches work with fixed **quantities** (e.g. m<sup>3</sup>, t, per capita etc.) and costs and tariffs, and usually relate to sewer-based sanitation that in most cases is paid via the

water supply, to which it is tied financially. In sanitation projects these quantities often cannot be clearly identified from the outset.

- The **data problems** generally encountered, especially with regard to slums and rapidly growing peri-urban areas, further compound the difficulty of performing the analysis (e.g. few or no reliable baseline data on the environment, population and health).
- Quantifying the **economic effects** (e.g. climate, health, environment) on households, operators and users is difficult, because the individual effects cannot be unequivocally attributed to the various factors. (For instance, are effects on health attributable to behavioural changes, or improved access?) This is why economic effects are calculated largely using proxy indicators such as lifetime and working time lost, health costs, shadow prices etc, in order to reflect non-monetary factors and factors that are difficult to quantify.
- A **macroeconomic assessment** at the level of individual projects is not absolutely essential, though it is required by donors such as the EIB and EU. In this case the economic effects (e.g. on health and the environment) should be quantified and the EIRR calculated. Alternatively, it is possible to refer to international impact assessment studies.

Please refer to Annexes 1, 2 and 3 for further practical information.

## Annex 1: Actors along the sanitation chain

In urban zones **responsibilities** are usually distributed as follows:

Area	Responsibilities – mandates	"Typical problems"	Possible incentives
Hygiene	Ministry of health sector ministries (e.g. health) local and regional authorities municipalities	Lack of resources and capacities, occasionally disinterest	Hygiene education and implementation requirements
Standards and regulations	Various sector ministries (e.g. planning, health, economics/financing) local and regional authorities municipalities regulatory authorities	Standards are often clear, though their application remains weak.	Improved availability of resources Capacity building
Sanitation marketing	Municipalities, NGOs, etc.	Lack of resources and capacities	Generally high level of motivation, improved coordination
Financing	Government, IFIs, private households	Low willingness to pay among households	Financing opportunities, mobilisation of demand through sanitation marketing

The following **actors** are found along the sanitation chain:

Area	Responsibilities – mandates	"Typical problems"	Possible incentives
Private toilets	Private households	Low level of interest, lack of resources	Creation of demand among private households, OBA financing schemes, maintenance of building requirements
Public toilets	Municipality, private operators	Lack of business opportunities, unclear or lax regulation	Creation of income-generating opportunities for operators, effective monitoring
Institutional toilets	Institutions and ministries (e.g. ministry of education and schools, ministry of health and hospitals)	Inadequate hygiene standards and availability, low availability of resources, low interest in sustainability	Improved availability of resources, effective monitoring of operators
Storage of feces, fecal sludge, possibly urine	Respective operators	Non-compliance with norms and standards, low demand, lack of income-generating opportunities	Creation of income-generating opportunities for operators, effective monitoring
Emptying,	Municipality, local	Inappropriate disposal,	Creation of income-

transport	utilities, private companies	offer low interest among operators, lack of clear institutional responsibilities, few income-generating opportunities	generating opportunities, effective monitoring and sanctions
Treatment, cleaning	Treatment plant operators	Greater interest in sewage	The creation of income generating opportunities

## Annex 2: Practical information along the sanitation chain

### Toilets

Component	Information
Private family toilets, household connections and private shared toilets	<ul style="list-style-type: none"> <li>• No additional monetary income but operating costs for the household/the users (possibly also costs for the attendant)</li> <li>• Expenditure on construction often exceeds the financial means and/or willingness to pay, therefore grants are often necessary and helpful; they are also warranted by health sector targets.</li> <li>• Financial participation by users should be included where possible, as this strengthens ownership.</li> <li>• The share paid by end users can also be financed through consumer loans.</li> <li>• Where possible the duration of financing should be based on land tenure.</li> <li>• The type of latrines/tanks financed must be harmonised with a sanitation chain (must fit into an existing chain, or a new chain must be established).</li> </ul>
Landlord toilets (owned by landlords)	<ul style="list-style-type: none"> <li>• Value of property increased</li> <li>• Important and appropriate because they increase the degree of coverage</li> <li>• Additional cash flow to be expected due to increase in value of property</li> <li>• Grants are therefore basically not appropriate, but may be warranted under certain circumstances due to leverage effect. This must be closely examination in each case.</li> <li>• Size of investment within the range of small-scale loans (cash-flow-related lending)</li> <li>• Financing repayable in full or in part</li> </ul>
Community toilets	<ul style="list-style-type: none"> <li>• Operating costs for the household/the users (possibly also costs for the attendant)</li> <li>• Users are often poor sections of the population, financing can therefore have a pro-poor effect</li> <li>• The specific sociocultural circumstances must be taken into account in this respect, however.</li> <li>• A realistic strategy for maintenance and cleaning of the latrines must be in place.</li> </ul>
Public, commercially operated toilets (e.g.	<ul style="list-style-type: none"> <li>• Direct cash flow to be anticipated from user fees</li> <li>• Operation can therefore also be outsourced to private operators</li> </ul>

at markets, bus stops, in sports arenas)	<p>(regulations to be imposed and monitored by the responsible authority!!!)</p> <ul style="list-style-type: none"> <li>• Possibly additional business opportunities for the operator (e.g. advertising)</li> <li>• Grants may in some cases be warranted by the public interest (major effects on health and the environment; keeping of fees low)</li> <li>• The operator should always make a contribution of his own if he is profit-oriented.</li> </ul>
Toilets in public institutions (schools etc.)	<ul style="list-style-type: none"> <li>• No additional cash flow to be expected.</li> <li>• Operation may be outsourced under certain circumstances.</li> <li>• Public interest extremely strong (health, environment)</li> <li>• Financing in full through grants may therefore be warranted.</li> <li>• Responsibilities often involve several levels (both ministry and utilities or municipalities), hence framework conditions must be clarified.</li> <li>• A realistic concept for maintenance and cleaning of the latrines must be in place.</li> </ul>

### Emptying, transport, treatment, disposal

Component	Information
Sewer-based systems (sanitation chains)	<ul style="list-style-type: none"> <li>• The recipient of the financing is usually a utility</li> <li>• Covers all steps along the sanitation chain</li> <li>• Is able to collect fees from end users for the services it delivers</li> <li>• Projects and financing sums usually very high, financing period long</li> <li>• Financing therefore often involves a mix of grants and loans The main focus should be on tariffs and fees (pricing)</li> <li>• These should normally collected on a monthly basis</li> </ul>
On-site systems (transfer of sufficiently stabilised fecal products by the user)	<ul style="list-style-type: none"> <li>• CAPEX only, no public follow-on costs for operation as the entire sanitation chain is privatised</li> <li>• Correspondingly higher support for CAPEX may be considered, if this creates certainty for sanitation</li> <li>• Costs for needed accompanying measures and hygiene measures must also be taken into account (control recommended)</li> </ul>
Non-sewer-based sanitation chains	<ul style="list-style-type: none"> <li>• Different actors along the sanitation chain in some cases</li> <li>• Transport on the one hand, and treatment, deposition or recycling on the other, are often performed by different actors</li> <li>• Different financing strategies required</li> <li>• Mix of grants and loans can be designed differently</li> <li>• Framework conditions and project sizes may vary widely</li> <li>• Regulation and monitoring are necessary</li> <li>• Emptying intervals are irregular, only every 3-5 years</li> <li>• Nevertheless, fee collection cycles should be short, as poor households are barely able to save and mobilise larger amounts of money, and this stabilises the operator's cash flow</li> </ul>

### Annex 3: Cost categories for integrated sanitation

#### Investment costs – CAPEX

Whenever integrated sanitation infrastructure (sewer-based, non-sewer-based with on-site disposal and non-sewer-based with off-site disposal) is installed and operated, the following costs are incurred:

- |   |  |
|---|--|
| Investment in hardware on private and/or public land    | <ul style="list-style-type: none"> <li>• Latrines and/or parts thereof for on-site and non-sewer-based sanitation/household connections and toilets for sewer-based sanitation (supply of materials and equipment)</li> <li>• Construction and installation costs (service)</li> <li>• Training measures for end users (service)</li> </ul>  |
| Investment for transport, treatment, storage, recycling | <ul style="list-style-type: none"> <li>• For sewer-based sanitation               <ul style="list-style-type: none"> <li>• Sewer systems</li> <li>• Treatment plants</li> </ul> </li> <li>• For non-sewer-based off-site disposal               <ul style="list-style-type: none"> <li>• Vehicles (suction vehicles etc.)</li> <li>• Holding tanks</li> <li>• Sludge treatment plant</li> <li>• Drying beds</li> <li>• Final treatment plant</li> <li>• Landfills</li> </ul> </li> <li>• For non-sewer-based on-site disposal               <ul style="list-style-type: none"> <li>• Very low investment or none at all</li> <li>• Training measures for the operator (service)</li> </ul> </li> </ul> |
| Investment in human capital                             | <ul style="list-style-type: none"> <li>• Sanitation marketing</li> <li>• Hygiene measures</li> <li>• HCD for the operator/executing agency with respect to the hardware investment</li> <li>• Formation of user groups, mobilisation of the population</li> <li>• Strengthening of the willingness to pay</li> <li>• Continuous technical assistance (service)</li> <li>• Capacity development for municipal authorities (monitoring etc.)</li> </ul>  |

These costs are usually incurred by different actors:

Costs...	...incurred by...	Remarks
Investment in hardware on private land (latrines/toilets, holding facilities, household connections)	Households	Grant is usually needed in order to facilitate investment
Investment in hardware on public land (latrines/toilets, holding facilities, connections to the sewer system)		Grants can be provided on the basis of a sustainable operating strategy
Investment in hardware for transport/sewers, treatment/clarification plant, storage, possibly recycling	Service providers	Grant/financing usually required, low-cost alternative technologies should be considered
Investment in human capital	Social services, NGOs, consultants	Financed through grants

## Operating costs – OPEX

Operating costs are incurred in the following categories: (i) materials and consumables, (ii) write-offs, (iii) spare parts and maintenance costs, (iv) personnel costs, management and administration, (v) energy (electricity, fuels) and (vi) external services (technical assistance, accounting, training etc.).

Operating costs for the end user	<ul style="list-style-type: none"> <li>• Emptying (service)</li> <li>• Transport and treatment/holding (service)</li> <li>• Recycling (service)</li> <li>• Water tariff for WC</li> <li>• Wastewater tariff</li> <li>• Maintenance costs</li> </ul>
Operating costs for service providers	<ul style="list-style-type: none"> <li>• Emptying</li> <li>• Transport (via sewers or vehicles)</li> <li>• Treatment (clarification plant)</li> <li>• Storage</li> <li>• Recycling/ sale of products obtained</li> </ul>

The scope of these costs results mainly from the technology used along the sanitation chain, and from the possibility of generating economies of scale. International lessons learned demonstrate that operating costs are often grossly underestimated. For simple, non-sewer-based systems in rural areas these costs usually are in fact low, especially where on-site disposal (i.e. by the user on private land) is possible without an external service provider providing treatment. With more complex technologies that require greater investment in infrastructure, e.g. for transport and off-site treatment technologies, through to sewer-based pump-driven systems (i.e. with sewers that include a treatment plant), operating costs may rise dramatically. When allocating operating costs it is therefore important to take account of the following factors:

- Operating and maintenance costs at household level should also be borne by users. However, corresponding measures and incentive systems, as well as financing, tariff and payment arrangements, must be designed so as to ensure proper and regular emptying. This also applies to all kinds of toilets that are used by more than one household, and indeed especially to these.
- For sanitation systems that include off-site treatment of fecal matter stored on site, the costs for emptying and transport usually constitute the largest cost factor. However, these depend to a significant extent on the technology selected. Although manual emptying is cheaper, it entails higher risks for the environment and health. On the other hand, professional and safe emptying, especially of fecal sludge that is not well stabilised (pit latrines) using appropriate emptying vehicles, generates high costs. Further cost drivers include the disposal distances covered in non-sewer-based sanitation, i.e. the distance between the user and the treatment site, as well as suction vehicles for poorly accessible districts such as slums.
- With sewer-based systems (i.e. sewer-based wastewater removal plus treatment plant), the scope of operating costs depends on (i) the length and width of the sewer system and the pumping required, and (ii) the operating inputs (human and other resources; power consumption, technical inputs for operating and maintaining pumps, aerators, valves and costs for treating additional products such as sewage sludge, biogas and solid waste. The operating costs for a treatment plant are also usually higher than those for non-sewer-based systems.

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