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THE PHILIPPINE WATER REVOLVING FUND FOLLOW-ON PROGRAM

SANITATION PRICING IN THE PHILIPPINES:
A COMPARATIVE ANALYSIS

FINAL REPORT

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SANITATION PRICING IN THE PHILIPPINES: A COMPARATIVE ANALYSIS

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Acronyms

AWWA	American Water Works Association
BWD	Baliwag Water District
CWA	Clean Water Act
DENR	Department and Environment and Natural Resources
DGSS	Office of the Director General of Sewerage Services (of Malaysia)
EPA	Environmental Protection Agency
FFCs	Front footage charges
GOP	Government of the Philippines
IWK	Indah Water Konsortium
IST	Individual Septic Tanks
IUWASH	Indonesia Urban Water Supply and Sanitation Project
LGU	Local Government Unit
LWUA	Local Water Utilities Administration
MWCI	Manila Water Company Inc
MWSI	Maynilad Water Services, Inc.
MWSS	Metropolitan Waterworks and Sewerage System
NGO	Non-Governmental Organization
NRW	Non-Revenue Water
NWRB	National Water Resources Board
O&M	Operating and Maintenance Costs
PhP	Philippine Peso
PWRF-FP	Philippine Water Revolving Fund Follow-On Program
RM	Ringgit Malaysia
SDC	System Development Charges
SMICZMP	Southern Mindanao Integrated Coastal Zone Management Project
SpTF	Septage Treatment Facility
SPAN-Act	*Suruhanjaya Perkhidmatan Air Negara* Act
SRF	State Revolving Fund
SSA	Sewerage Services Act (of Malaysia)
SSO	Sanitary Sewer Overflow
STP	Septage Treatment Provider
US	United States
USAID	United States Agency for International Development

USD	United States Dollars
WD	Water Districts
WEF	Water Environment Foundation
WHO	World Health Organization
WSIA	Water Services Industry Act (of Malaysia)
WSS	Water Supply and Sanitation
WSSC	Washington Suburban Sanitary Commission

Executive Summary

The purpose of this study is to inform the Philippine Water Revolving Fund Follow-On Program's (PWRF-FP) technical support to the Local Water Utility Administration (LWUA) in the development of a unified sanitation pricing framework. More specifically, the review considers such key issues as the underlying economics behind tariff setting, broad design considerations for rate calculation, various approaches to sanitation pricing in select countries, and, finally, the advantages and disadvantages of specific rate-setting frameworks in the context of sanitation services in the Philippines.

Concerning the underlying rationale for the study, poor sanitation continues to have a devastating impact on the quality of life in the Philippines, engendering the spread of disease and hampering the nation's economic development. The World Bank estimated, for example, that poor sanitation causes 20,000 premature deaths and costs PhP 77.8 billion per year. As the default form of sanitation, the inadequate management and maintenance of on-site systems represents a major facet of the broader sanitation challenges faced by the Philippines.

Notably, the underlying development assumption that on-site systems would eventually be replaced be centralized sewerage is increasingly being called into question given astronomical construction costs. Recognizing that septic systems may continue to represent the primary means to treat wastewater in many communities, it is clear, then, that a new regulatory strategy is necessary. Specifically, a hybrid approach to sanitation—where centralized checks are introduced to decentralized systems—offers a pragmatic, sustainable alternative. Such an approach is not viable, however, unless accompanied by a pricing framework that promotes cost recovery and the expansion of quality desludging and treatment services.

The Fundamentals of Rate Design. Reliable water sector services—whether water supply, sewerage, or septage management—are fundamental to prosperous communities. Pricing water services is, however, fraught with complexity given the need to balance both economic objectives (such as revenue sufficiency, economic efficiency, equity, and affordability) and socio-political objectives (such as political acceptability, social objectives, and regulatory compliance). The rate-making process represents the path in which these diverse objectives are realized in the form of user rates and fees charged to the public. Broadly speaking, this process includes: (1) the determination of the revenue requirements, (2) the allocation of those requirements to cost components and customer classes, and (3) the development and design of a rate and fee schedule.

International Experience. While the body of research and best practice documentation for sanitation pricing is relatively limited, we can nonetheless see several notable trends from the international cases included in this study. First, centralized sewerage charges are generally based on water consumption in most countries given the strong linkage between the volume of water supplied to a property and the volume of wastewater exiting that property. Further, in the United States, the most common structure for centralized sewerage rates is uniform volumetric tariffs, wherein the price per unit remains constant as consumption increases. Not surprisingly, water and sewerage charges are frequently combined into a single bill.

Second, when it comes to septage management, the "fee-for-service" model appears to predominate, with a mix of both government operated septage haulers (i.e. Malaysia) and private sector haulers (the US and Indonesia). The treatment facilities, however, are generally operated by a public enterprise, with the costs recovered by, for example, the issuance of annual licenses to private haulers (the US) or by charging tipping fees at the treatment facility (Indonesia). By charging septage fees at the time time of disposal, however, haulers face a fiscal disincentive to bring waste to the plant and frequently resort to illegal dumping.

Third, the delivery of effective sanitation services requires a clear policy framework and a strong regulatory environment. Malaysia mandates regular desludging of septic systems, for example, as well as making scheduled visits to all government facilities. Similarly, local governments in the US such as Fairfax County, Virginia, require both households and private haulers to report each time a septic tank is desludged, with desludging frequency then tracked in a central database. Conversely, septic management programs in both Indonesia and Vietnam have typically suffered from the acute lack of local supporting septage management policies, leaving maintenance and disposal choices largely to residents.

Sanitation Pricing in the Philippines. A broad legal framework already exists at the national level for the delivery of sanitation services and, more specifically, the recovery of the requisite costs. The Philippines Constitution (1987), the Local Government Code (1991), Presidential Decree 198 (1973), and the Clean Water Act (2004) all contain policies and guidelines pertinent to sanitation pricing. The legal framework at the local government unit (LGU) level, however, is less developed and requires particular attention as water districts design and implement sustainable septage management programs. Notably, several local governments have proactively adopted new policies and pioneered innovative septage management approaches. Table 1 below summarizes the key aspects of four such cases, including the pricing strategy.

Table 1: Summary of Septage Management Programs

	Dumaguete City	Alabel Municipality	Metro Manila	Baliwag Municipality
Services Provided:	Scheduled desludging every 3 years	Schedule desludging services; Septage Treatment for 2,500 HH	Schedule desludging services by both concessionaires every 5 years;	Schedule desludging services every 5 years; Mechanized septage treatment.
Facilities:	Non-mechanized SpTF with 80 cubic meter/day capacity; 2 vacuum trucks	Non-mechanized SpTF with 60 cubic meter/day capacity; 2 vacuum trucks	MWCI: 2 SpTF with 1,400 m3/day capacity and 80 trucks; MWSI: 1 SpTG with 500 m3/day capacity and 25 trucks.	Fully mechanized SpTF with a capacity of 30 m3 per day; Two desludging trucks
Operator:	Water District	Local Government Unit	Manila Water and Maynilad	Baliwag Water District
Policy Framework:	Ordinance No. 18 / 2006	Ordinance No. 048 / 2008	Concession Agreements	Ordinance No. 16/2009

	Dumaguete City	Alabel Municipality	Metro Manila	Baliwag Municipality
Pricing Approach:	Uniform price per cubic meter of water consumed.	Flat Fee payable in installments or in a lump sum.	Percentage of water bill	Percentage of water bill (but embedded)
Pricing Details:	WD Customers: P2 / cubic meter; Non-WD Customers: P1,200 fee for service;	Residential: P 1080 per household or P 360.00/year or P 35.00/month	Both MWCI and MWSI charge a 20% fee on water charges.	10% of the monthly water bill for all residential and commercial customers.
Comments:	Revenue-sharing agreement between WD and LGU.	Customers from GenSan play key role in the financial viability of the SpTF.	The environmental fee is the same for both sewer and septage customers	Septage fee will be embedded within the bill.

Septage Pricing Options. In terms of key options or "decision-points" for septage pricing, these include (1) the approach to the determination of revenue requirements (i.e. cash needs versus rate of return), (2) the billing and collections mechanism, and (3) the rate structure. Table 2 below summarizes the advantages and disadvantages of the principle rate structure options that emerged under the study.

Table 2: Summary of Rate Structure Options

	Percentage of Water Bill	Uniform Rate / m3	Flat Environmental Fee per Month
Advantages	• Very easily implemented; • Affordability → Allows for cross-subsidy; • Equitable among WD customers*	• High economic efficiency → Direct proportionality; • Easily implemented; • Equitable among WD customers*	• Transferable across LGU regardless of source; • Directly tied to the cost of service; • Easily implemented; • Broader revenue base??
Disadvantages	• Not transferable to non-WD customers; • Not directly related to the cost of desludgng service → Low transparency. A "cap" may be used to better reflect the cost of service.	• Not transferable to non-WD customers; • Not directly related to the cost of desludging service; • Affordability concerns (regressive)	• Economic Efficiency → No disincentive to consume less; • Affordability concerns (regressive)

* Although there is limited evidence that greater water consumption = more septage costs

Study Conclusions. As LWUA seeks to provide guidance concerning septage pricing to the water districts that it regulates, the PWRF-SP recommends that the Administration consider the following conclusions resulting from this study:

- ✓ **To the maximum extent possible, the establishment and operation of a water district (WD) septage management program should be coordinated with the LGU and codified within the local policy framework**. Given the significant negative externalities associated with sanitation, the full benefit of the septage management program will only be realized when the LGU as a whole implements improved septage management practices. The execution of an LGU ordinance that mandates regular household desludging and septic tank inspections is the logical first step to development of the local policy framework.
- ✓ **Septage management cost centers and revenue streams should always be ring-fenced from water supply accounts in order to ensure the accurate accounting of incoming and outgoing funds**.
- ✓ **To determine the revenue requirements for a septage management program, water districts should continue to utilize the cash needs approach in order to remain consistent with current pricing practices**. However, in order to strengthen the "business case" for septage management, WDs may consider the following strategies: (1) budget for healthy operating and debt reserves, on the order of 8 to 10%; (2) include a sinking fund for vacuum trucks in anticipation of fleet replacement, and (3) charge a premium to to clients availing of services from outside the political jurisdiction to compensate the WD and LGU for the associated risk of serving these clients.
- ✓ **All three pricing approaches can recover the same amount of revenue requirements. Thus, the selection of the tariff structure is, fundamentally, a *policy decision* tied to local service conditions and development objectives**. If the LWUA and WDs prefer to base septage charges on the *cost of service* and facilitate septage services beyond WD customers, then PWRF-SP recommends the use of the flat fee approach, which most closely approximates the costs that the WD will incur to service an individual septic tank and is easily transferred to non-WD customers. A subsidy for low income households may be applied to mitigate the regressive nature of this approach.

  If the priority of LWUA and WDs is to provide greater incentives for customers to consume lower volumes of water as well as to incorporate cross subsidies into septage pricing, PWRF-SP recommends the percentage bill approach. However, to protect customers from excessive charges over the long term due to unrelated water rate hikes, we recommend the inclusion of rate caps that require formal due diligence and public consultation prior to adjustment.
- ✓ **The easiest and most practical means of billing for septage management services for WD-operated septage management plans is to include the fee within the water bill itself as a *distinct, separate line item* that is clearly labeled as "sanitation fee" or "septage fee."** Viable alternatives for non-WD customers include the property tax and as part of business permits (for commercial entities).

Perhaps the most important determination of success for WD septage management programs going forward will be the flexibility to make changes based on what works and what doesn't as more experience is gained on the ground. Obtaining feedback from the water districts and the customers themselves and changing course where necessary will be critical to engendering sustainable septic management practices, thereby protecting vulnerable groundwater resources and safeguarding public health.

Chapter 1: Introduction

The Philippine Water Revolving Fund Follow-on Program (PWRF-FP or the "Program") aims to assist the Government of the Philippines to develop an innovative and sustainable financing mechanism for water supply and sanitation (WSS) projects. Funded through a technical assistance grant provided by the US Agency for International Development for the period December 1, 2011 to May 31, 2013, the Program consists of the following services:

- Expert services to facilitate further loan transactions under PWRF;
- Training services to the staff of selected national and local government agencies related to the effective implementation of the "Safe Water for All" grant program for waterless municipalities;
- Expert advice to concerned GPH agencies on on-going water sector reform initiatives;
- Secretariat support to the sub-working group on water supply and sanitation of the Philippine Development Forum.

A crucial factor in the implementation and sustainability of the PWRF-FP—not to mention the improvement of service provision as a whole—is the facilitation of strategic financing reforms accompanied by the development of a pipeline of bankable projects. In line with its objectives, the Program has continuously supported initiatives of the government to enhance financing, regulatory, and institutional mechanisms to encourage investments for WSS development and improve service coverage and performance. In this regard, in close coordination with one of the Program's key counterparts—the Local Water Utilities Administration (LWUA)—PWRF-FP has actively sought to bolster access to improved sanitation through the development and piloting of innovative financing methodologies. Under the first phase of the Program, for example, PWRF-SP (the for runner of PWRF-FP) prepared a business model and accompanying financial projection tool for water districts (WDs) interested in the establishment of integrated septage management facilities.

As a follow on to the septage management business model effort, PWRF-FP is presently seeking to assist LWUA—as the principal regulator of Water Districts—in the development of a unified sanitation pricing framework. While LWUA currently possesses standardized guidelines for setting water tariffs, a similar set of policies and procedures does not yet exist for charges related to sanitation[1]. As Water Districts begin to expand their services to include sanitation—a move that is actually required by the Philippines Clean Water Act of 2003—such guidelines will go a long way towards ensuring a degree of standardization as individual districts propose new tariffs for LWUA's consideration.

The purpose of this study, then, is to inform the Philippine Water Revolving Fund Follow-on Program's technical support to the LWUA through the comparative analysis of potential sanitation pricing frameworks[2]. More specifically, the review considers such key issues as the underlying economics behind tariff setting, broad design considerations for rate calculation, various approaches

[1] In the context of this paper, the term "sanitation" refers specifically to septage and sewerage services. Further, given the minimal usage of centralized sewerage systems in the Philippines, the focus of this analysis will be on septage pricing.

[2] The term "framework" herein refers to the collective policies, procedures, and documentation necessary for the development of a unified tariff-setting approach.

to sanitation pricing in select countries, and, finally, the advantages and disadvantages of specific rate-setting frameworks in the context of sanitation services in the Philippines.

Concerning overall structure, in Chapter 2 the study begins with a brief introduction to rate the design process as a whole, including economic objectives, approaches to the determination of revenue requirements, and the apportionment of costs across users. Woven throughout this chapter is a discussion concerning the unique aspects of sanitation pricing. Chapter 3 then reviews experiences of sanitation pricing in four countries, including the United States, Malaysia, and Indonesia. In Chapter 4, we turn to the current sanitation pricing paradigm in the Philippines, including the policy framework and current experiences in septage management. Finally, building from the previous three chapters, in Chapter 5 we consider the respective advantages and disadvantages to several different sanitation pricing frameworks.

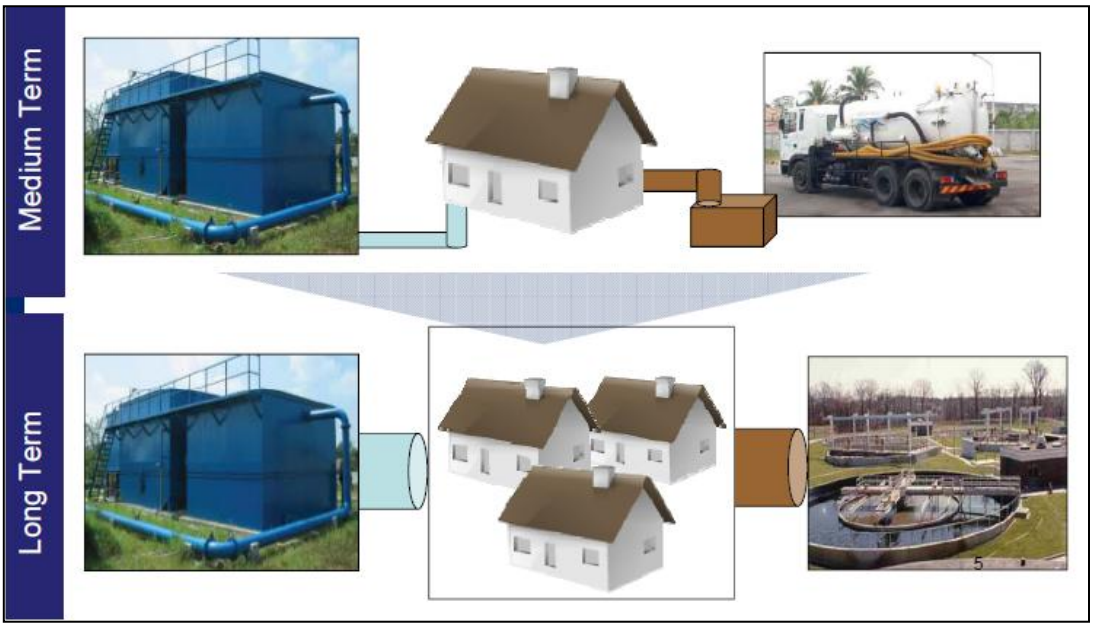
A NEW APPROACH TO SEPTAGE MANAGEMENT

Prior to delving into the conceptual background of sanitation pricing, it is first important to briefly expand on the rationale for focusing on septage pricing and improved septage management more broadly. In this regard, two key points arise.

First, poor sanitation continues to have a devastating impact on the quality of life in the Philippines, hampering the nation's overall economic development. The World Bank estimates, for example, that poor sanitation causes 20,000 premature deaths per year as well as costing PhP 77.8 billion per year, or 1.5% of GDP (Water and Sanitation Program, 2011). Importantly, on-site systems are currently the default sanitation technology in the Philippines, with less than 5% of the country connected to piped sewerage systems. Thus, the persistent inadequacies in the installation and management of on-site systems represent a major facet of the nation's broader sanitation challenges. On a related note, for water districts specifically, there is a very powerful argument to be made in terms of how improved septage management can impact the operations and sustainability of WDs given that approximately 80% of their raw water is sourced directly from groundwater. In the absence of regular desludging, the millions of septic tanks across the country essentially become conduits of raw sewerage into groundwater and nearby drainage canals.

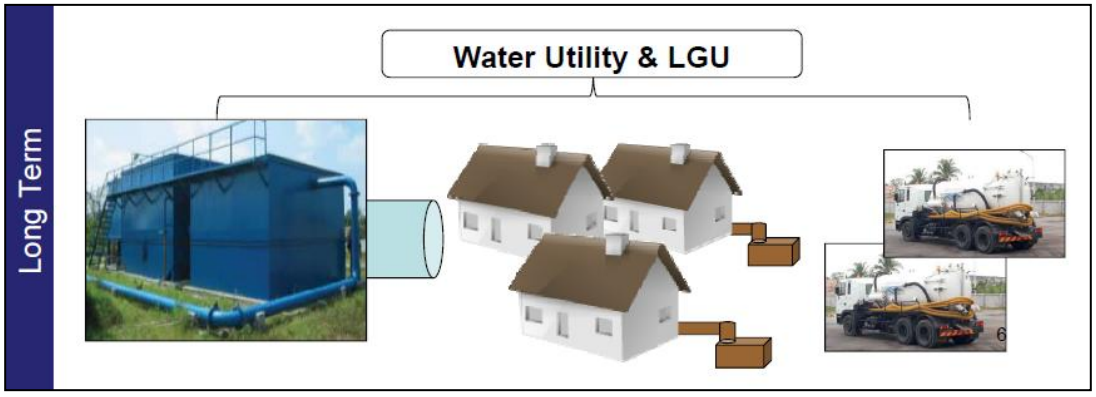
Second, there has long been an underlying development assumption when it comes to sanitation that septage is a "medium term" solution. In other words, as urban areas become more densely populated and progress into modern metropolises, it has historically been presumed that decentralized septage would be replaced by larger, centralized systems (see Figure 1 below). In many places around the world, however, this assumption is now being called into question given the prohibitive cost of installing sewer networks and retrofitting cities. Thus, local governments are starting to look at ways to better use and build upon the systems that are already in place, including septic systems.

Figure 1: The Sanitation Development Assumption



That said, in order to ensure that decentralized infrastructure is properly maintained and that the abundant negative externalities associated with sanitation are minimized, it is clear that a new strategy is necessary. A **hybrid approach** to sanitation—where centralized checks are introduced to decentralized systems—offers a pragmatic, sustainable alternative. In other words, decentralized infrastructure should not automatically assume decentralized institutional arrangements; rather, the oversight of a single institution such as a water utility may be necessary to ensure that the potential of on-site systems is maximized. Importantly, however, a hybrid approach cannot work without close collaboration between the local government unit and the operator. It also cannot work unless we implement a pricing framework that allows operators to recover their costs, protects consumers, and facilitates jurisdiction-wide service.

Figure 2: The Hybrid Approach - Centralized Management of Decentralized Sanitation



Chapter 2: Water Sector Pricing

It is difficult to overstate the importance of pricing in the water sector. Despite the fact that the issue rarely surfaces in the mainstream media outlets, the determination of fair and adequate prices for water supply and sanitation services has a tremendous impact on the ultimate quality of these services, which, in turn, impacts the health—both physically and economically—of the local community. Simply stated, reliable water sector services[3] are fundamental to prosperous communities.

Pricing water services is, however, fraught with complexities. As a public good with extensive externalities, the provision of such services naturally falls under the domain of government. Notably, the *provision* of a public service is distinct from the *production* of a public service (Oakerson, 1999). Provision entails the organization of a public service—putting in place the policies, institutional arrangements, taxing and spending mechanisms, and legal framework necessary to meet the needs of citizens. Production, however, consists of the delivery of the service itself, which, in the case of water services, requires developing the infrastructure, systems, and human resources to take water from source to tap[4].

Generally speaking, the production of these services is effectively outsourced to a local service delivery unit in the form of a utility. And here is where the complexities truly begin. As public services and natural monopolies[5], utilities and their regulators are tasked with applying a reasonable price tag—one that provides the resources needed to adequately fund water sector services in a defensible manner. This is a daunting task, and one with which even the most "advanced" economies globally continue to struggle. In the United States—which is discussed in greater detail in Chapter 3—investment has not kept pace with wastewater management needs, for example, resulting in an annual discharge of nearly 900 billion gallons of untreated sewage (American Society of Civil Engineers, 2011).

At the crux of such underinvestment is a lack of revenue—be it in the form of user charges, environmental fees, or other taxing mechanisms. Thus, in many ways, whether the flush of a toilet leads a treatment plant or a nearby river starts with the determination of the "right" price tag and, importantly, how this price tag is allocated across beneficiaries. In the following sections, we consider the conceptual building blocks and design considerations that underlie water sector pricing.

2.1 - SETTING THE STAGE: ECONOMIC AND SOCIAL OBJECTIVES

It is often said that tariff setting for public utilities is as much an art as it is a science. One of the principal reasons for this is that, while there is certainly a "hard numbers" aspect to setting rates,

[3] We use the phrase water sector services to refer to both water supply and wastewater/septage removal.
[4] The terms *production*, *delivery* and *operation* are henceforth used interchangeably to refer to the actual implementation of water services.
[5] The production of clean water is, by its very nature, asset-intensive, requiring significant upfront investment in costly infrastructure, thereby raising the barriers to market entry to prohibitive levels. It is simply inefficient, in other words, to have two different companies installing separate transmission and distribution lines into the same communities and neighborhoods.

there is also a plethora of economic and social objectives intertwined with the process, making the manipulation of a spreadsheet, in many ways, the easy part. Building off the analysis of Boland and Whittington (2000), these objectives—which can be both complimentary and competing—include the following:

- **Revenue Sufficiency**. Service providers need to have the revenue necessary to cover their costs, thereby ensuring water supply and sewerage systems can be operated, maintained, and replaced on a sustainable basis. One of the key challenges with revenue sufficiency in wastewater and septage management is the timing of both revenues and costs. Regarding revenues, it is critical that the utility has a reliable, stable source of revenue to fund its day to day expenses. On the cost side, utilities must consider ways to match their revenue stream with the "lumpy" nature of capital costs to construct facilities such as treatment plants and distribution systems. Indeed, finding ways to "smooth" these costs over time is one of the perennial challenges of utility financing.

  A second, related challenge is the clear determination of the "revenue requirement" for the utility. While one may assume that a basic analysis of the utility's books should be sufficient to calculate the revenue requirement, the process is not always so simple, particularly due to the fact that rate design is inherently a forward-looking process. The primary approaches to determination of the revenue requirement—including the cash needs approach and the utility approach—are discussed in more detail in the following subsection.

- **Economic Efficiency**. The concept of efficiency when applied to utility tariffs essentially means that the benefit received by users is in proportion to the costs paid out. An efficient tariff, then, creates incentives for the consumer to use, but not overuse, the resource or facility in question. Put differently, an efficient tariff ensures that costs are minimized for a given level of benefits.

  Unfortunately, the achievement of economic efficiency is particularly challenging when it comes to administering wastewater fees due to the predominance of externalities associated with sanitation. In other words, three out of four houses on a street may diligently pay to have their septage removed and tanks maintained, but fail to reap the benefits of this investment due to the groundwater contamination caused by their neighbor's overflowing septic tank. Despite the service provider's best efforts to maximize benefits while minimizing costs, almost any price paid by a household that continues to suffer from the ill effects of localized pollution will unfortunately be paying too much.

- **Equity**. The notion of equity is straightforward: those that act the same are treated the same. Equity in tariff design, then, means that, "users pay amounts proportionate to the costs they impose on the utility" (pg. 221). In other words, in accordance with the "polluter pays" principle, the more a user pollutes the more it pays. Importantly, when it comes to wastewater, a polluter's share should, ideally, be measured both in terms of the volume of waste generated as well as the density of the pollutant loading. In terms of the former, the volume of wastewater is generally ascertained based upon the volume of water delivered to the customer (with allowances made for any outdoor usage), or, in the case of septage, on the volume of septage vacuumed from the septic tank.

Regarding the latter, customers are often classified based upon the *types* of wastewater (in terms of nutrient loading) that they are prone to generate. Capital and operating and maintenance (O&M) costs associated with treating various nutrient levels are then allocated across the customer classifications accordingly. Notably, classification based on nutrient loading is generally less applicable to septage treatment due to the relative homogeneity of sludge from households. Also, sludge from more potent industrial and commercial sources is generally treated separately by the producers themselves.

- **Affordability**. A final economic principle underlying tariff design is affordability. Designing rates that ensure sufficient revenues to construct state of the art facilities is meaningless if users do not have the money to pay for the service. To guard against this scenario, most countries have set guidelines for the maximum percentage of household income available for water and sanitation bills.

  Embedded within the concept of affordability is, of course, the issue of subsidies for low-income users. While much has been made of the need for subsidies for the poor in the water supply sector, the reality is that most low-income families are already paying significantly higher amounts for vended water. As such, the argument for substantive subsidies in order to make clean water affordable is tenuous indeed. The same cannot be said, however, of wastewater/septage costs, as this is generally not even a current cost in the household budget. Thus, affordability is, in many ways, a more tangible concern when it comes to sanitation, and policymakers must therefore consider how subsidies might best be applied to minimize the potential financial burden. That said, anecdotal experience shows that households rarely come close to exceeding the aforementioned percentage ceilings, indicating a strong likelihood that substantive fiscal space remains to include sanitation costs under the same pricing caps. This issue is addressed more completely for the Philippines context in Chapter 4.

The achievement of revenue sufficiency, economic efficiency, equity, and affordability are not, of course, the only criteria that inform the rate design process. Indeed, these objectives are often overshadowed—if not outright eclipsed—by sociopolitical considerations that dictate what is acceptable in the "real world." Such considerations include the following:

- **Political Acceptability**. The political dynamics in a given jurisdiction play a powerful role in determining what types of policies and reforms will be prioritized and what will be left to languish. Thus, ignoring these dynamics when it comes to rate development will most certainly undercut a rate proposal, no matter how well it may meet the aforementioned economic objectives. As political scientist Ariel Dinar notes, "The power system that comprises political parties, electoral systems, interest groups, and the dissemination of information has proven important in planning and implementing water pricing reforms." (Dinar, 2000, p. 8).

  Unfortunately, a recent political economy analysis conducted by DAI in the Philippines showed that those entities with the greatest influence in the development of sanitation infrastructure in the Philippines—including local governments units (LGUs) and Water Districts (WDs)—also generally possess the lowest level of interest in improving sanitation systems (McCluskey, 2011). On the positive side, however, the same analysis indicated that these interest levels can be bolstered through the demonstration of tangible financial benefits

to the governing entity, a conclusion that holds promise for the political acceptability of cost recovery sewerage and septage rates.

- **Social and Environmental Objectives**. Closely related to the political dynamics of a given service area are the social objectives that often drive public service delivery. More specifically, there may be certain service targets or "environmental rights"[6] that result in pressures to both decrease or even increase rates. Note that the achievement of social objectives related to increased service to the poor is often wholly distinct from affordability concerns. In other words, social objectives to make service "accessible" to the poor may keep water and sanitation prices far lower than what low-income households can actually afford.

- **Simplicity/Ease of Implementation.** Water services rates must be both relatively easy to understand and implement. Regarding the former, altering unit rates every cubic meter to reflect marginal costs may improve economic efficiency, but it will only confuse the user and yield more volatile revenue streams for the operator. Regarding the latter, equity may be enhanced by using more robust measurements of the volume and nutrient loading of the waste generated by each household, but the complexity and costs of such techniques is likely to be prohibitive.

- **Regulatory Compliance.** Statutory and the accompanying rule-driven compliance can play a significant role in driving up the costs that utilities face, which then has a direct impact on the rates that they must charge. One of the biggest determinants of sewerage rates in the United States for example, is the requirement to meet certain effluent standards set by the Environmental Protection Agency. Utilities found to be in violation of such standards, will be issued a consent order to improve the quality of their discharges within a specified time period or risk monetary penalties. In some ways, regulatory compliance represents a means of counterbalancing political economy considerations (at least on a day-to-day basis) by removing the culpability of rate increases from local level political actors, who can assert that national-level regulations left them "no choice" but to adjust rates.

As stated at the outset of this section, attempting to accommodate the competing economic objectives and sociopolitical considerations that drive rate-setting is very much an art. In other words, it is, fundamentally, a process that necessitates compromise as policy-makers attempt to balance the needs of a diverse set of stakeholders.

2.2 - THE RATE-MAKING PROCESS

[6] The human "right to water," for example, is an oft-cited argument for keeping water supply rates at a certain level.

The rate-making process represents the path in which the objectives and consideration outlined above are realized in the form of a set of user rates and fees charged to the public. While it is outside the scope of this study to provide an in-depth description of the pricing process[7]—indeed, entire manuals are generally dedicated to this complicated task—it is nonetheless useful to present an overview here as a point of reference for the case studies in Chapter 3 and the set of sanitation pricing options for the Philippines discussed in Chapters 4 and 5. More specifically, in the subsections below, we briefly explore the key elements and terminology inherent in the three phases of the pricing process: 1) the determination of the revenue requirements, 2) the allocations of those requirements (costs) to cost components followed by customer classes, and 3) the development and design of a rate and fee schedule. Notably, the discussion herein is limited to the technical aspects of this process, meaning it does not address the consultative or procedural elements of pricing, which can vary significantly from one jurisdiction to another.

Figure 3: The Rate-Making Process

Phase One: Determination of Revenue Requirements

The first phase of the pricing process involves the determination of the utility's revenue requirements. In other words, how much revenue does the utility need to provide sanitation services over the coming rate period? While this might seem to be a relatively straightforward endeavor, there are several complicating factors. First, historical costs are not always a reliable indicator of future costs, given that the infrastructure needs of the service area are likely to change. Second, even when service level needs remain constant, historical revenue requirements must still be closely scrutinized to help ensure efficiency given the lack of a competitive environment. Third, balance sheet information—though perfectly accurate—can be interpreted in different ways, yielding distinct rate structures. In this regard, there are two fundamental approaches to the interpretation of financial statements for wastewater systems:

- **The Cash Needs Approach**. The cash needs approach (also referred to as the cash-flow approach or the cash needs approach)[8] is essentially based on the notion that, "revenues of the utility must be sufficient to recover all cash needs, including debt obligations as they come due, for the period over which the rates are intended to be adequate" (Water Environment Federation, 2005, p. 76). In other words, the principal objective of the cash needs approach is to collect sufficient revenues to cover all cash expenses, and, as such, is generally derived from the provider's cash-flow financial statement. This approach is generally used for municipally-owned, non-stock utilities that are essentially accountable to their customers only.

  It is important to note that, under the cash approach, there is no allowance made for a financial return in the form of surplus revenues. Instead, all revenues above and beyond the

[7] The terms "rate-making" and "pricing" are used interchangeably throughout this study.
[8] Note that the "cash approach" has not relation to whether or not a utility utilizes cash accounting or accrual accounting.

utility's operating and capital expenses should be allocated to financial reserves (including O&M reserves and debt service reserves) in accordance with the utility's planning policies and debt covenants.

- **The Utility Approach**. The utility approach to the determination of revenue requirements (also commonly referred to as the "rate of return" approach) defines revenue requirements based on the profit-loss statements, meaning that it takes into consideration depreciation expenses and financing costs (interest) while also allowing for a specific rate of return based on the value of the utility's assets. As such, the utility approach attempts to compensate its "shareholders" (such as the municipality or customer base) for the business risk associated with the investment of funds in the utility's assets and operations. As a result of this more business-oriented perspective, the utility approach for calculating revenue requirements is often favored by private operators or by municipalities that have a substantial number of customers outside its service area. (Water Environment Federation, 2005).

Table 1 below summarizes the key differences between the cash approach and the utility approach. While two additional methodologies exist for the calculation of revenue requirements—the price cap and revenue cap—these tend to be geared more towards sectors with a higher degree of competition such as the electricity sector.

Table 3: Approaches to Determination of Revenue Requirements

	Cash Approach	Utility Approach
Generally Used By:	Municipally owned and operated utilities (generally serving only residents of the municipality itself)	Private Utilities; Utilities overseen by a central regulator; or those with substantial "external" customers.
Types of Expenses:	▪ O&M expenses ▪ Operations and maintenance reserves ▪ Payments in lieu of taxes ▪ Debt Service Payments ▪ Equipment purchases ▪ Capital improvements from revenue	▪ O&M expenses ▪ Operations and maintenance reserves ▪ Payments in lieu of taxes ▪ Depreciation ▪ Return
Revenue Targets Above Cash Expenses Determined By:	Utility reserve policies. For example, a utility may adhere to a policy of retaining a minimum reserve balance of 5-10% of operating costs.	A percentage return on the rate base. The "rate base" consists of the depreciated value of the assets in service. The value of the return is set in accordance with the level of business risk.
Primary Source of Financial Information:	Cash Flow Financial Statement	Profit-Loss Financial Statement

Phase Two: Cost Allocation

The utilization of a *cost-of-service* approach to pricing essentially means that the costs behind the revenue requirements are allocated to customers (or, more generally, to customer classes) based

upon cost causation theory (American Water Works Association, 2000). Generally speaking, this allocation process consists of three steps (WEF, 2005):

- **Step One: Allocation by Activity Center**. To begin, costs are grouped according to their respective activity centers.[9] In the wastewater management sector, common activity centers include: collection, pumping, treatment/disposal, and customer accounts, and general administration. In terms of septage management, collection and pumping costs associated with underground pipe networks would be replaced with desludging and hauling costs using trucks.
- **Step Two: Allocation by Cost Causative Components.** Once costs are organized by activity center, they must then be allocated by cost causative components. Put simply, cost components are the features of the system that drive the value of the costs incurred. The expected peak flow of wastewater, for example, is a key driver of the size of the transmission pipes for sewerage systems. Other common cost components include the daily volume of waste to be treated, the strength of the wastewater (in terms of suspended solids or biochemical oxygen demand, for example), and the number of customers. In terms of methodologies used to actually assign values to each cost component, utilities generally make these calculations based upon either (a) the engineering designs for the physical plant, or (2) the current functions of each aspect of the physical plant.
- **Step Three: Allocation Across Customer Classes.** The final step of the allocation process is to delineate customer classes based upon usage patterns and then assign costs to each customer class accordingly. Put differently, the distribution of costs across customer classes attempts to account for the varying level of demands that each type of class places on the system. This step would not be necessary, of course, if all customers had similar usage patterns, meaning the cost of serving each customer was approximately the same (WEF, 2005). While a homogeneous usage pattern is common in septage management[10], it is rare for sewerage systems where there is often a degree of variation between residential and commercial customers. The former, for example, would generally provide the greatest volume of wastewater each day, meaning that they should bear the majority of volume-based costs (such as chemical and pumping costs). Similarly, commercial customers may be responsible for generating wastewater of greater strength, and thus should bear the costs of the additional equipment required to safely treat this waste.

The complexity of the allocation process will, of course, vary widely based upon the size of the utility, the diversity of the customer base, and the characteristics of the waste being treated. In the case of septage treatment as a stand-alone service, the activity centers might be limited simply to collection/hauling, treatment, and billing. Further, as noted above, if the customer base is homogeneous in nature, then there is minimal need to engage in a cost-causation analysis. Nonetheless, rate studies carried out for septage projects should consider the need for cost allocation and provide an appropriate justification if it is ultimately not carried out.

[9] These are also often referred to as "cost centers."

[10] This assumes that the septage treatment plan is serving only residential septic tanks, as commercial/industrial septage is generally required to be treated by the producers themselves in many countries (including the Philippines). Thus, the principal difference from one customer to another is the capacity of the septic tank being desludged.

Phase Three: Rate Design

The final phase of the pricing process is the development of the rate schedule which translates the costs allocated to each customer class into specific unit charges. There are two fundamental types of charges:

- **Fixed Charges**. Fixed charges remain constant from one billing period to the next, regardless of the amount of wastewater/septage generated by the customer. The amount of the fixed charge can, of course, vary by customer class, meaning that some allowance may be made for *anticipated* differences in the volume of waste generated by the different types of customers, but these will always be just estimates. What's more, fixed charges will never be able to account for the volumetric differences *within* a specific customer class.

  The utilization of fixed charges alone is more common in the wastewater sector than in the water supply sector given the lack of metering. This approach is, however, becoming less and less widespread as more utilities tie wastewater usage to the volume of water consumed by the customer (WEF, 2005). When fixed charges are combined with volume-based charges, they are generally referred to as service charges or, if a set volume is included, minimum charges.

- **Volumetric Charges**. The utilization of volumetric charges increases equity across the customer base by ensuring that customers that generate similar amounts of wastewater are charged similar rates. As noted above, the industry standard when it comes to piped wastewater is to base the amount off the volume consumed by the household, with the assumption that the volume of water entering the premises represents an accurate proxy of the amount exiting the premises. In countries where there may be significant outdoor water use that would effectively overstate a household's contribution to the sewerage system, utilities will often base the charge on the volume consumed in the winter months, when it is assumed that outdoor usage is minimal.

  There are three principal types of volumetric charges: uniform, increasing block, and decreasing block. A uniform charge is one in which the rate per cubic meter is constant, no matter what the level of approximated discharge might be. With increasing block charges, distinct volumetric blocks are identified—usually with 10 cubic meters per block—and the per cubic meter rate increases as customers cross the threshold from one block to the next. One might also characterize this approach as progressive pricing, and it is often used to as a means to encourage conservation, particularly in the water supply sector. Conversely, under decreasing block charges, the rate per cubic meter actually decreases as customers cross the threshold from one block to the next. The underlying logic here is that the pricing structure reflects the economies of scale associated with wastewater services in that, in general, the marginal price of each unit of wastewater treated generally declines as volumes increase. Generally speaking, when it comes to the treatment of piped wastewater, a uniform rate is the most commonly implemented volumetric charge (WEF, 2005).

Once the most appropriate combination of charge types has been selected, the next step is to determine the billing units, which, in the wastewater sector are generally volume based (i.e. per cubic meter) and customer based (i.e. per customer bill issued). The total allocated costs per customer group can then be divided by estimated number of billing units to arrive at a final cost per

unit. This unit cost represents the foundation of the rate schedule, and, once a complete draft schedule is developed, rate developers should, in effect, run the financial analysis in reverse, starting with the base unit rates and building up to the expected overall revenues to be generated over the effective rate period. In rerunning the numbers, developers can (1) verify that the calculated unit costs will yield the estimated revenue requirements, and (2) analyze the expected impacts of the proposed rates on customer's monthly bills. Ultimately, rate adjustment approvals often hinge on these numbers, as policy-makers want to clearly understand the impact on revised rates on individual household budgets.

2.3 - SUPPLEMENTARY CHARGES AND FEES

While user rates consisting of fixed and volumetric charges frequently make up the bulk of local revenues in the wastewater sector, it is important to note that local governments possess other revenue tools to supplement earnings from user charges. Pertinent examples in this regard include the following:

- **System Development Charges**. The use of system development charges (SDCs) represents an alternative approach to pay for the cost of major capital expenditures. Generally, such charges are aimed at paying the costs for increased capacity caused by urban and peri-urban growth (AWWA, 2000). While SDCs may not necessarily eliminate the need for "pay-as-you-go" or debt-financed capital costs, they can nonetheless reduce dependency on these types of user rate dependent financing sources. In this regard, one of the chief benefits of system development charges is that they shift the burden of growth to those that are more directly causing the growth, such as private developers.

  While more common for sewerage systems, SDCs could also be charged to developers installing septic systems on their properties to compensate for the increased demands that will be implicitly placed on septage treatment facilities.

- **Front Footage Charges**. Front footage charges (FFCs) typically represent a type of *ad valorem* tax, meaning that they are tied to local property taxes. The purpose of FFC's is generally to recuperate the costs on the sewerage piping that runs in front of the property, and thus they are often calculated based upon the length of the property adjacent to the street. As discussed in Chapter 3, FFCs are relatively common in the United States.

- **Environmental Permits and Licenses**. Environmental permits are often used in cases of onsite wastewater management, both when septic systems are initially approved for use and constructed, as well as when it comes time to de-sludge septic tanks and treat and dispose of the waste. As discussed more in the case studies below, the utility or local government may approach licensing and permitting in a number of ways, such as by licensing septage disposal trucks or requiring waste hauling companies to hold waste management permits.

- **Tipping Fees**. As an alternative to the licensing of septage disposal trucks (or in addition to the issuance of such licenses), utilities may also choose to charge tipping fees for the disposal of sewerage/septage at their treatment plant. An advantage of such fees is that it facilitates the introduction of volume-based charges. Trucks—be they privately operated or public operated by an adjacent district—are charged in a number of ways, including total truck capacity (with the assumption that the truck is coming to the plant full) as well as total weight of discharged waste.

In addition to the above supplementary revenue sources, it also bears mentioning that, in light of the extensive externalities associated with sewerage and septage management, there is a very sound economic argument for the use of general funds by local governments (and, indeed, by national governments) to support better sanitation infrastructure. General funds are typically used in one of two ways. First, national government support is often an important component of countrywide, landmark regulatory reforms that require extensive new infrastructure investments. As noted below, such is the case in the US as well as Malaysia. Second, local regulatory costs are also generally best-funded through more stable general funds. In many ways, it is the local department of environmental protection, for example, that represents the first line of defense when it comes to monitoring compliance, and thus it is critical that such offices be adequately funded.

Chapter 3: Country Case Studies

Building from the above conceptual foundation, we turn now to examples of how sanitation pricing objectives and methodologies have actually been implemented in several countries. In terms of format, the below case studies begin with a succinct description of the wastewater sector as a whole, including principle types of infrastructure and institutions involved, the key aspects of the policy and regulatory environment, and the general approach to sanitation financing and pricing. Where applicable, we then look specifically at the one to two local government units within each country, recognizing that it is really at the local level where services are delivered and we can move away from generalities and discuss the realities of implementation.

In terms of the selection of the case studies, this was largely driven by the availability of documentation. Not surprisingly, there is not a wide body of research or best practice documentation when it comes to sewerage pricing. This body only further dwindles when it comes to septage pricing in particular. While water pricing has long been a hot topic among policy-makers, regulators, and practitioners alike, then, it seems that a similar level of interest has not yet taken hold in the sanitation sector. There are signs that this is beginning to change, however, as more and more countries realize the devastating effects of paltry sanitation services on their citizens and move to finance improvement in a sustainable and cost effective manner.

3.1 - THE UNITED STATES

Country Context

The United States currently operates approximately 14,780 wastewater treatment plants and 19,739 wastewater pipe networks (EPA, 2008). Nearly all of these systems are publicly owned and together serve the vast majority of the population. Approximately 56 million people across the country—or 18% of the population—rely on decentralized, onsite sanitation systems. Generally speaking, onsite sanitation systems are limited to more rural areas where the installation of centralized treatment is not cost effective.

While the US is considered to have achieved universal coverage in terms if access to improved sanitation facilities, it is noteworthy that significant challenges remain to water quality protection. More specifically, many of the sewerage networks in the United States were originally constructed to carry wastewater and storm-water in the same underground channels. Unfortunately, during periods of intense rainfall, the storm-water frequently overflows into the section of the pipe carrying wastewater, resulting in the direct discharge of untreated wastewater into nearby waterways. Thus, the combination of wastewater overflows and aging infrastructure leads to an estimated discharge of 900 billion gallons of untreated sewage every year (American Society of Civil Engineers, 2011). Additionally, in an era of growing austerity as local government budgets face cuts in all sectors, the manpower required to monitor on-site sanitation systems is difficult to come by. Not surprisingly, then, ill-maintained septic systems also represent a substantial threat to groundwater quality.

Policy Environment. The Clean Water Act of 1973 (and its subsequent amendments) provides the regulatory and funding framework for wastewater treatment in the US. In its original form, the CWA provided both the “stick” and the “carrot” to advance the wastewater sector in the United

States. Concerning the former, the Act sets for the specific performance levels that municipal utilities must attain prior to discharging effluent into surface waters. Essentially, the Act requires secondary treatment of all wastewater, thereby removing at least 85% of contaminants (Copeland, 2010). Regarding the carrot, however, Title II of the CWA established a grant program to help local governments meet the substantial costs associated with the new requirements. Since 1973, the Federal Government has disbursed approximately $85 billion to improve wastewater services. Notably, approximately 50% of this funding was distributed in the first 10 years of the program, which resulted in a surge of construction in the 1970s (Copeland, 2010).

Interestingly, the CWA also played an important part in establishing a cost-recovery rate paradigm in the US. Section 204 (b) sets out a set of guidelines that any applicant for Federal funding must implement in order to be considered eligible. Specifically, Section (b) (1) states:

> Notwithstanding any other provision of this title, the Administrator shall not approve any grant for any treatment works…unless he shall first have determined that the applicant (A) has adopted or will adopt a system of charges to assure that each recipient of waste treatment services within the applicant's jurisdiction, as determined by the Administrator, will pay its proportionate share (except as otherwise provided in this paragraph) of the costs of operation and maintenance (including replacement) of any waste treatment services provided by the applicant; and (B) has legal, institutional, managerial, and financial capability to insure adequate construction, operation, and maintenance of treatment works throughout the applicant's jurisdiction, as determined by the Administrator.
>
> In any case where an applicant…uses a system of dedication ad valorem taxes…which results in the distribution of operation and maintenance costs for treatment works within the applicant's jurisdiction, to each user class, in proportion to the contribution to the total cost of operation and maintenance of such works by each user class (taking into account total waste water loading of such works, the constituent elements of the waste, and other appropriate factors), and such applicant is otherwise in compliance with clause (A) of this paragraph with respect to each industrial user, then such dedication ad valorem tax system shall be deemed to be the user charge system meeting the requirements of clause (A) of this paragraph for the residential user class and such small non-residential user classes as defined by the Administrator…A system of user charges which imposes a lower charge for low-income residential users (as defined by the Administrator) shall be deemed to be a user charge system meeting the requirements of clause (A) of this paragraph if the Administrator determines that such system was adopted after public notice and hearing (US Congress, 2002).

In clauses following the above, the Act continues to lay out criteria for the design of rate schedules, with a heavy emphasis on *proportionality*, meaning that users pay in proportion to the demand that they place on the utility (i.e. the "polluter pays" principle). The Act specifically notes that, when determining the adequacy of charges imposed on different types of users, the utility should deliberately include "all factors that influence the cost of waste treatment, including strength, volume, and delivery flow rate characteristics of waste." There is a strong emphasis, then, on the incorporation of volume-based rate determination throughout the legislation. Indeed, if volume based rates are not utilized, then the utility must, "establish a procedure under which the residential

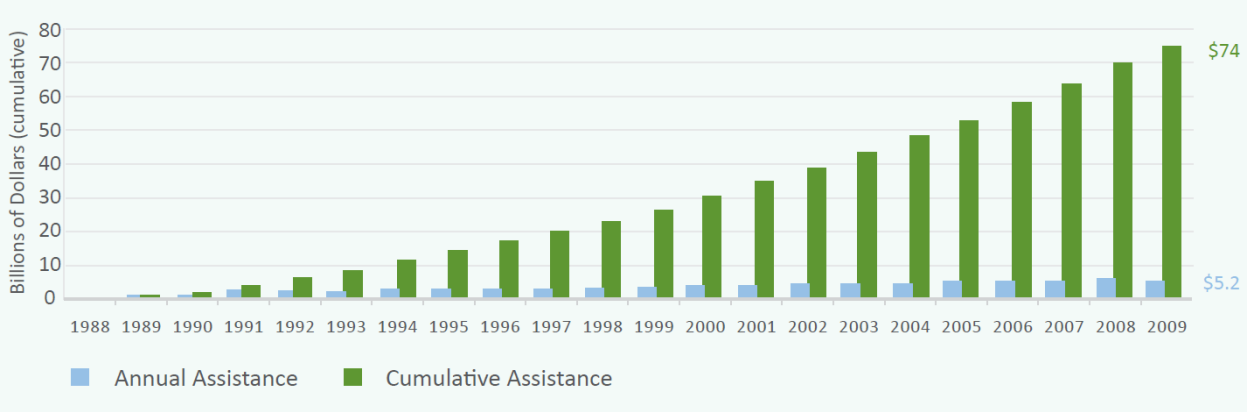
user will be notified as to that portion of his total payment which will be allocated to the costs of the waste treatment services."

The above statutory requirements, then, essentially set forth the wastewater user rate framework that it is still in use in the US today. While the details have been worked out of the years, the same economic foundation of proportionality continues to endure. While municipalities and their utilities could have opted to approach rate-making differently, of course, this would have been a foolhardy decision given the sums of money at stake, particularly over the first decade that the CWA was in effect.

Infrastructure Financing. As noted above, the Federal Government has played a substantial role in the financing of wastewater infrastructure in the United States. While this began as a pure grants program under the auspices of the Clean Water Act, it later morphed into what can be best described as a "revolving fund" program that sought to leverage Federal funds by combing local (state) funds as well as resources from the debt market. More specifically, the 1987 Amendment formally established the State Water Pollution Control Revolving Funds (SRFs) which continue to receive yearly appropriations from Congress that must be accompanied by a 20% matching grant from participating state governments. In many cases these funds are further leveraged through the issuance of pooled municipal bonds by the respective SRF. Figure 4 below shows the annual and total funding allocations by the Federal Government to the Clean Water (Pollution Control) State Revolving Funds.

It is, however, a misnomer that the wastewater sector is wholly funded by the Federal government. According to the Mayors Water Council, since 1970 local governments have spent approximately $300 billion on capital outlays in nominal dollars, and another $400 billion on operations and maintenance costs. (Anderson, 2010)

Figure 4: Federal Funding of Clean Water Revolving Funds



Source: (EPA, 2010)

Services Pricing. In terms of sewerage pricing, while it is difficult to generalize across a country as diverse as the United States, the following principles are widely implemented at the local level for centralized sanitation systems:

- As noted in the discussion above concerning the Clean Water Act, rates for sewage services in the US are meant to recover the full costs of the services and, where possible, are generally linked to the level of water consumption. Tying sewage charges to water consumption is usually straightforward in the US given that it is quite rare that a utility would only provide sewage services (as opposed to both water and sewer), and thus the data is easily accessible.
- Residents connected to both a centralized water supply system and sewerage system generally pay an appreciably greater amount for wastewater services than water supply services. Indeed, a survey of the 50 largest water and wastewater utilities in the US found that customers generally pay about 30% more for wastewater services than for water supply services, which is not surprising given the greater costs associated with moving and treating sewage when compared to water. (Black and Veatch, 2010)
- Of the many different rate structures available, a uniform tariff is the most commonly type employed in the wastewater sector. A survey by the University of North Carolina, for example, found that 76% of the 333 utilities surveyed in the state utilize a uniform tariff structure, with an increasing block structure the second most prevalent (12%) (UNC Environmental Finance Center & NCLM, 2006).

Cost structures and pricing approaches are, of course, very different for decentralized sanitation systems. Generally speaking, local governments in the US play a regulatory role—as opposed to a direct service provision role—when it comes to the management of on-site systems, which are used in approximately 25% of all homes in the US (EPA, 2003). For the most part, the construction and maintenance costs of on-site systems are borne entirely by the homeowner.[11] Further, costs associated with the removal and treatment of septage are charged directly by licensed private sector companies to homeowners at the time of service. These charges wrap in, of course, any licensing fees or tipping fees charged by the local utility to actually dispose of the waste. Unfortunately, it is impossible to generalize the approach utilized in the determination of such fees given the wide variation of methodologies and lack of comprehensive research. That said, the two case studies below provide a reasonable glimpse into how local governments approach septage management and pricing in the US.

Washington Suburban Sanitary Commission of Montgomery County, Maryland

Established in 1918, the Washington Suburban Sanitary Commission (WSSC) is the nation's eighth largest water supply and wastewater utility, serving approximately 1.8 million residents in Montgomery County as well as neighboring Prince George's County. The WSSC operates eight water and wastewater treatment plants across the service area, and possesses about 8,800 kilometers of water supply pipelines and 8,600 kilometers of sewer pipelines. Overall, WSSC treats about 200 million gallons of wastewater per day, with six out of the eight plants providing tertiary treatment (Washington Suburban Sanitary Commission, 2012).

[11] That said, some local government offer subsidized loans as a means to mitigate the up-front cost of installing robust septic systems.

Concerning the determination of customer rates, WSSC takes a holistic, "balanced-budget" approach by developing a rate structure that ensures annual revenues meet or exceed projected costs (Hudson, 2012). Notably, the utility utilizes the cash needs basis for calculating the utility's overall revenue requirements. Thus, the calculation of wastewater tariffs takes into account the level of debt service (principal and interest) to finance the WSSC's assets, as opposed to depreciation expenses. The text box at right summarizes pertinent long-term fiscal policies adhered to by the Commission as it seeks to deliver safe and reliable drinking water to its customers and treat wastewater in a manner that meets or exceeds local and federal regulations.

Sampling of WSSC's Long Term Fiscal Policies:

- Conform, to the extent possible, to the County Council's established spending affordability limits in preparing the capital and operating budgets;
- Annual set user charges for water and sewer services at levels sufficient to ensure that revenues equal or exceed expenses in each fiscal year;
- Utilize and account maintenance fee to recover the fixed costs of servicing a customer's account;
- Maintain a reserve un the water and sewer operating funds equal to at least 5 percent of water and sewer charges to offset unanticipated variations in revenue;
- Finance capital facilities needed to accommodate growth through a System Development Charge in new development.

Source: (Washington Suburban Sanitary Commission, 2012)

In terms of customer billing, then, sewer charges are included in the water bill and are generally based upon the volume of water consumed by the household in the form of average daily consumption.[12] Contrary to the norm, the WSSC utilizes increasing block rates for sewer charges (as well as water supply charges), with the first 10 blocks consisting of increments of 50 gallons per day[13]. In other words, a customer that averages 51 gallons per day of water consumption over the billing period will pay a higher unit rate than a customer that averages only 49 gallons per day. Notably, the WSSC utilizes General Construction Bonds to pay for the construction of sewer lines and supporting facilities. The debt service for such bonds is then financed through a number of mechanisms, including customer bills, system development charges, and front-foot benefit charges (Washington Suburban Sanitary Commission, 2012). Front-foot charges appear as part of each customer's property tax bill, and are assessed based upon the length of property adjacent to the street.

In terms of septage management in Montgomery County, the WSSC's facilities serve as the primary point of disposal for the private sector hauling companies that service the 23,000 septic systems in the county[14]. Overall, the utility maintains four sites that licensed haulers can utilize to empty their trucks. As shown in Table 4 below, the WSSC charges an annual license fee per vehicle based upon the size (volume) of the vehicle's storage tank. According to the Commission's Public Affairs Unit, the WSSC takes several factors into consideration, including the maintenance and surveillance costs for each discharge site, administrative costs associated with permitting haulers, inspection costs, and

[12] The exception to this policy is if a customer has a separate water meter specifically for outdoor use. In such cases, the volume of water for outdoor use is not included in the calculation of sewer charges. Notably, for customers with a single water meter, WSSC makes no distinction between seasonal fluctuations in water use—it does, not, in other words, base sewerage charges on winter usage patterns.

[13] There is actually an additional 6 blocks of varying sizes for large users.

[14] Of the 23,000 on-site systems, approximately 8,000 utilize public (piped) water, while the remainder utilizes wells for drinking water. (Von Gunten, 2012)

the rates charged by neighboring jurisdictions. Importantly, the Commission strives to set rates at a level which encourages the legal discharge of waste (Hudson, 2012).

Once licensed, companies may then dispose of an unlimited volume of waste into the system. This pricing approach is somewhat different than neighboring counties that generally use tipping fees based on weight or volume to offset additional treatment costs. Anecdotal evidence suggests that a number of haulers carry waste across jurisdictions so as to avail of the absence of tipping fees in Montgomery County. Households may choose from among any of the licensed haulers in the County, with desludging charges averaging approximately $250 per visit (Von Gunten, 2012).

Table 4: WSSC Septage Licensing Fees

Truck Size	Annual Cost per Vehicle
1 – 49 gallons	$154
50 – 799 gallons	$2,265
800 – 1,499	$6,170
15,000 gallons +	$14,641
Industrial Disposal	$220 / 1,000 gallons

Source: **(Washington Suburban Sanitary Commission, 2012)**

Beyond the licensing of private sector hauling companies, WSSC is not involved in the regulation of the county's on-site systems themselves, a function which falls to County's Department of Permitting Services (DPS). Acting under the authority of the State Code for Septic Management, DPS regulates the construction of all septic systems in the county, including the location and design specifications of each system. The Department is set up as an enterprise fund, meaning that its operating costs are sourced solely from its permitting revenues.[15] The DPS—which is staffed with two field inspectors, two planner reviewers, and one manager—does not track the frequency of desludging at this time but is considering such a policy in the future. (Von Gunten, 2012)

On a final note, WSSC's rates for sewerage services continue to increase steadily thanks in part to a Sanitary Sewer Overflow (SSO) Consent Decree issued by the US Environmental Protection Agency in 2004. Specifically, the Department of Justice filed a lawsuit on behalf of the EPA and four environmental groups concerning violations of the Clean Water Act. To settle the lawsuit, the WSSC developed a 12 year plan to repair and replace substantial sections of its sewer network, accelerating a total investment of $350 million. (Washington Suburban Sanitary Commission, 2012).

Fairfax County, Virginia

Wastewater treatment in Fairfax, Virginia is organized directly by the county government itself under the Department of Public Works and Utilities. Overall, the County-maintained sewerage lines and treatment facilities service 340,000 connections across 230 square miles. Residents connected to the sewerage system pay a uniform rate per 1,000 gallons, where the volume is based upon average household consumption during the winter months. (Fairfax County, 2012). The County actually utilizes one of the same treatment plants as the WSSC based upon an inter-municipal agreement.

Septic system management in Fairfax is overseen by the County's Department of Health, which adheres to a strict regulatory framework in order to minimize groundwater and surface water

[15] A permit to construct a septic system, for example, costs $1,028.

contamination from the 20,000+ on-site systems across the jurisdiction. Pertinent characteristics of this framework include the following (Thompson, 2012):

- "Pump and haul systems" are not permitted anywhere in the County, meaning that each septic system must have sufficient space and suitable soils for a leach field. Some systems even have a secondary treatment device, such as aeration or filtration device.
- Similar to Montgomery County, each homeowner must obtain a permit to construct a septic system, which is inspected prior to the commencement of use.
- After a septic tank is put into use, the County requires that it be pumped at least once every five years. The County employs a two-way chain of communication to monitor compliance in that both the homeowner and hauling company are required by the municipal code to submit documentation when the tank is pumped. Records are then maintained in a database that tracks the desludging frequency of all systems in the County. Homeowners that exceed the five-year maximum period, for example, are notified in writing. Also, the County will follow-up with residents who appear to be emptying their septic systems more frequently than expected, which can also be indicative of a problem with the system. Homeowners with more advanced systems may need to be inspected annually.
- Homeowners in violation of these regulations may be taken to court if they refuse to take corrective actions. According to the Department of Health, however, such occurrences are rate, and a written warning is generally sufficient to prompt action.
- All septage haulers must be licensed by the County, which requires the inspection of their equipment and vehicles.

In terms of the pricing of septage services, Fairfax County also does not charge a tipping fee at its disposal points, a policy that is meant, in part, to encourage the proper disposal of waste. Instead, a flat licensing fee of $700 per year is charged for each vehicle that offloads waste at the county-run treatment facilities. The County also charges a fee for the initial inspection of on-site systems and any repairs in which it is involved. The cost of the pumping services to the homeowner is set wholly by the private company performing the work. Notably, a neighboring local government recently began charging tipping fees, and thus cross jurisdiction dumping is suspected to be a regular occurrence. (Thompson, 2012)

Case Study Take-Away Points

In terms of applying the approaches and lessons from the US case study above, key take-away points are as follows:

- ✓ The provision of sewerage services—both through centralized systems and on-site systems—is highly regulated. Thus, investment in sanitation services is driven by the need to meet the combination of federal, state, and local regulations on waste management and disposal. Service providers (as well as citizens in the case of on-site systems) that do not meet these regulations risk legal action and monetary penalties;
- ✓ The fundamental approach to the development of pricing regimes for centralized sewage services in the United States is derived from statutory requirements under the Clean Water act for rates to (1) cover the cost of service, and (2) be in proportion to the usage of the

customer. The use of subsidies is most prevalent in the provision of long-term financing for capital expenditures as opposed to in customer rate structure themselves;

- ✓ The most common structure for centralized sewage rates in the US is uniform tariffs that are linked to water consumption. Utilities often use supplemental charges such as system development charges or front-foot charges to help cover the cost of capital investments, thereby shifting some of the up-front costs to private developers as well as to homeowners via their property tax bill;
- ✓ Most local governments rely on the private sector to operate desludging services, and thus do not directly control the pricing structure. Local governments recover the costs of septage treatment by charging licensing fees on a vehicle by vehicle basis as well as through tipping fees. Further, local governments frequently possess monitoring systems to ensure the regular emptying of septic systems.

3.2 - MALAYSIA

Country Context

Malaysia is considered one of the more prominent success stories in the expansion of improved sanitation services in Asia. According to the UN's Joint Monitoring Program, 96% of the population of Malaysia has access to improved sanitation facilities as of 2010 (WHO / UNICEF, 2012). In contrast to the United States—and, indeed, most countries globally—the provision of sanitation services in Malaysia is highly centralized. The Indah Water Konsortium (IWK), a state-owned company, provides the majority of sewerage and septic services across the country, operating and maintaining over 5,700+ public sewage treatment plants and 13,000 kilometers of sewerage pipelines since April 1994 (IWK, 2012). The table below provides an overview of the nation's sanitation infrastructure as of 2010.

Table 5: Sanitation Infrastructure in Malaysia

Sewerage Facilities	2009		2010	
	Quantity	Population Equivalent (PE)	Quantity	Population Equivalent (PE)
Connected Services				
Public Sewage Treatment Plant *(Includes Regional Plant)*	5,602 *76*	18,961,586 *5,107,499*	5,781 *78*	19,532,526 *5,638,858*
Private Sewage Treatment Plant	2,083	2,500,974	2,240	2,623,239
Septic Tank & Pour Flush				
Communal Septic Tank	4,373	531,593	4,382	546,160
Individual Septic Tank	1,286,897	6,434,483	1,254,622	6,388,240
Pour Flush	903,923	4,519,616	894,859	4,474,293
Others				
Network Pumping Station	773	N/A	829	N/A
Sewer Network (km)	14,748	N/A	15,344	N/A

Notes :

1. N/A : Not Applicable

Source: (SPAN, 2012)

Originally under private ownership, IWK was bought out and incorporated under the Ministry of Finance in 2000. The company possesses considerable expertise and resources—including nearly 3,000 staff—and has been highly acclaimed both domestically and regionally for the progress achieved over the past two decades (Din, 2010). In addition to the vast construction initiatives, IWK has put into place clear operating guidelines and regulations, including in the maintenance of septic systems. Not surprisingly, on-site sanitation represents the most common form of sanitation treatment in Malaysia, with approximately 1.2 million properties relying on septage treatment across the country (IWK, 2012). To facilitate the improved management of these systems, IWK developed a comprehensive database of septic-dependent properties, and conducted routine desludging services on a region by region basis, improving septic tank desludging rates from 2% in 1993 to 58 percent in 2001 (AECOM and EAWAG, 2010).

Policy Environment. Over the past two decades, the policy environment for the provision of sanitation services in Malaysia has been dominated by three key pieces of legislation: the Sewerage Services Act (SSA), the Suruhanjaya Perkhidmatan Air Negara (SPAN Act), and the Water Services Industry Act (WSIA).

Enacted in 1993, the Sewerage Services Act transformed the provision of sewerage provision in Malaysia. Key provisions of the SSA included the following (Government of Malysia, 1993):

- The Federal Government was granted executive authority over the provision of all sanitation services nation-wide, which included the transfer of all fixed assets to the control of the Federal Government;
- Following the receipt of all sanitation infrastructure, the Federal Government was granted authority to then enter in to a concession agreement with a private sector contractor of its choosing to operate, maintain, and expand sewerage services. A public tender process was not required;
- An Office of the Director General of Sewerage Services (DGSS) was created to, among other responsibilities, "formulate and implement a plan so that all reasonable demands for sewerage services are satisfied" (Clause 9a);
- In addition to overseeing the expansion, operation, and maintenance of all public sewerage systems, the DGSS was also given the power to regulate all private sewerage systems, which included the mandatory emptying of household septic systems every two years;
- Similarly, the DGSS was granted the authority to force any premise to connect to the public sewerage system, including requiring the construction of a network by the owner of the premises. The DGSS must also approve and or license the construction and operation of any form of sewage treatment;
- The Minister was granted the power to impose sewerage charges, fees or levy which shall be paid by any person to whom sewerage services are provided under the Act (Clause 30.1). No specific formula or approach to cost recovery was included, however, as part of the legislation.

The SSA ultimately laid the groundwork for the concession agreement to IWK. Importantly, the Act empowered the Federal Government to require property developers to put in place wastewater

infrastructure in accordance with national standards. Over time, this policy has meant that the private sector has financed and constructed approximate 70 to 80 percent of the nation's sanitation infrastructure (AECOM and EAWAG, 2010).

In 2006 the policy environment was dramatically altered once again with the passage of the Suruhanjaya Perkhidmatan Air Negara Act and Water Services Industry Act (which came into effect in 2007 and 2008, respectively). The former established the *Suruhanjaya Perkhidmatan Air Negara* (SPAN) or National Water Services Commission as the regulatory body to oversee the water services industry. The latter bill essentially revamped the legal framework for the regulation of water supply and sewerage nationwide, bringing greater standardization and efficiencies to the water sector by centralizing the ownership of all assets under the SPAN (Pengurusan Aset Air, 2012).

While the wave of new policies was primarily aimed at the water supply sector, there were also implications for the sewerage sector as well. With the nationalization of water supply infrastructure, for example, the management of water supply and sewerage became more closely integrated, which is expected to facilitate greater compliance with sanitation standards. Similarly, the WSIA also set forth higher penalties for those households that do not properly maintain their septic systems. More broadly, SPAN became the ultimate authority in the sector—providing licenses to operators as well as setting tariffs. It is not yet clear the extent to which SPAN will directly assume the sewerage management responsibilities currently under IWK, or remain strictly as a regulatory body. (AECOM and EAWAG, 2010)

Infrastructure Financing. When it comes to the construction of new wastewater infrastructure, the Government of Malaysia has adopted an approach akin to that of the United States in that the initial surge of wastewater infrastructure has largely been financed by the Federal Government. Since 2001, for example, the Government has invested more than RM 5 billion (PhP 70 billion) in sanitation infrastructure. Of this amount, RM 4.3 billion (PhP60 billion)—or approximately 86% of the total amount—was directly from the Ministry of Energy, Technology, and Water, while the remaining RM 725 million (PhP 10.2 billion) was from the balance sheet of IWK itself (IWK, 2010). The importance of this robust financial support cannot be overstated. While many countries in Asia and beyond have promulgated commitments to improved sanitation infrastructure, Malaysia has backed their pledge with considerable funds.

Notably, the WSIA also established a "Sewerage Capital Contribution Fund" which is under the management of SPAN. As noted in Clause 172 of the Act, the Fund is to be capitalized from the fees of "any developer or person that constructs (a) a building and connects the building to a public sewer, (b) a sewage treatment works without a sludge processing facility, and (c) a septic tank or communal septic tank that requires an off-site sludge processing facility" (Government of Malaysia, 2006). Thus, in many ways, the fund functions in a similar manner to the System Development Charges discussed under the US case study, providing another means to leverage capital from the private sector.

Services Pricing. Rates for centralized sewerage connections are heavily subsidized by the Federal Government, covering only an estimated 20% of operating costs as of 2009 (AECOM and EAWAG, 2010). Domestic sewerage charges are actually fixed per month, ranging from RM 2.00

to RM 8.00 per month; a "middle-income" home, for example, is charged RM 3.00 (or PhP 42) per month. Importantly, these basic charges are the same for a household regardless of whether it is connected to a centralized sewerage system or an individual/communal septic tank. Also, commercial and industrial customers are charged significantly higher rates, and the total bill is linked to the volume of water consumed when this volume exceeds 100 cubic meters per month. (SPAN, 2012).

Regarding sludge removal, the below table provides a summary of the costs associated with "responsive" desludging services provided by IWK. Unfortunately, the cost basis for the below fee schedule is not provided, although comparative evidence suggests that these rates are approaching cost recovery. With the passage of the Water Service Industry Act, scheduled desludging services are no longer mandatory, but rather provided upon customer request only. As noted above, however, the penalties for noncompliance increased substantially under this legislation, representing a fundamental shift in its regulatory approach. It remains to be seen as to whether this revised approach will be workable, although the company's 2010 Sustainability Report possesses a dubious tone, noting that the acceptance of scheduled desludging remains low and that the current approach appears to represent a "step back in sanitation" for the country (IWK, 2010).

Table 6: IWK Charges for Responsive Desludging Services

Type of Service	Charge
(1) Desludging Residential IST • Desludging of residential IST outside Local Authority. • Applies to Domestic premises and Government quarters.	180.00/trip (2,500 PhP)
(2) Desludging IST / private STP (up to 2.5m3) • Desludging of IST outside Local Authority/private STP with tank/plant size measuring up to 2.5m3. • Applies to Commercial, Industrial and Government premises. • Charge RM 360.00 per service.	360.00/trip (5,000 PhP)
(3) Desludging IST / private STP (> 2.5m3 to 4.5m3) • Desludging of IST outside Local Authority/private STP with tank/plant size measuring above 2.5m3 up to 4.5m3. • Applies to Commercial, Industrial and Government premises.	650.00/trip (9,150 PhP)
(4) Desludging IST / private STP (> 4.5m3) • Desludging of IST outside Local Authority/private STP with tank/plant size measuring above 4.5m3 • Applies to Commercial, Industrial and Government premises. • Charge based on the actual measurement of tank/plant size in m3 at RM145.00 per m3 (RM 650 onwards)	145.00 per m3 (2,000 PhP)
(5) Desludging pour flush (Residential)	48.00 per 2.5m3 (675 PhP)

Source: (IWK, 2012)

Not surprisingly, IWK openly states that its "uneconomic sewerage tariff rate" represents one of the greatest challenges to the sustainability of its operations. Over the last 15 years, sewerage rates have actually decreased four times, while costs continue to escalate as service coverage expands and

energy prices rise (IWK, 2010). Thus, the current reliance on subsidies seems likely to continue for the foreseeable future.

Case Study Take-Away Points

In terms of applying the approaches and lessons from the Malaysia case study above, key take-away points are as follows:

- ✓ Malaysia has made considerable gains in the provision of improved sanitation services by adopting a centralized management approach supported by a regime of robust subsidies from the Federal Government;
- ✓ In addition to substantial public investment in sanitation infrastructure, Malaysia has also leveraged considerable private sector investment by requiring developers to fund upfront the requisite wastewater infrastructure on new properties;
- ✓ Mandatory, scheduled desludging services proved to be an effective means of ensuring that on-site sanitation systems were maintained in accordance with design specifications.

3.3 - INDONESIA

Like many developing countries in Asia, the Republic of Indonesia has struggled to provide adequate sanitation to its population. According the WHO's Joint Monitoring Program of, approximately 54% of the population has access to improved sanitation facilities, up from 32% in 1990 and 44% in 2000 (WHO / UNICEF, 2012). While at first glance these numbers appear positive, it is equally important to note that a mere 2% of the population actually has access to centralized sewerage treatment facilities, which exist in only a handful of Indonesia's burgeoning cities. Further, Indonesia continues to lag behind neighboring countries in South-East Asia, which possess an average rate of access to improved sanitation of 67%.

Much like the Philippines, on-site systems represent the default form of sanitation country-wide. Unfortunately, the integrity of these systems—and the sustainability of septage treatment more broadly—have generally received insufficient attention, thereby contributing heavily to the degradation of the nation's surface water and groundwater resources. The resulting health and economic impacts are, of course, not surprising—the World Bank estimates annual economic losses on the order of USD 6.3 billion, or 2.3% of gross domestic product (World Bank, 2008). One of the principal challenges in the achievement of genuine progress towards stemming these losses is the fragmentation of the sector. Similar to the water supply sector, central government agencies such as the the Central Planning Agency, the Ministry of Public Works, the Ministry of Health, and the Ministry of Home Affairs all have a role to play in the development of improved sanitation and hygiene. Further complicating this mix of actors, is, of course, the extensive decentralization of public service provision that was enacted in 1999, but which is still very much a work in progress.

There is, however, cause for a cautious optimism as the awareness of Indonesia's acute sanitation needs—including in the area of septage management—appears to be growing, thereby bringing a greater sense of urgency to political actors at both the local and national levels. In particular, the Community-Based Total Sanitation program, which was launched in 2008, is registering solid gains in communities across the country. First launched in 2008, the program seeks to eliminate open

defecation by 2014 with a particular emphasis on bolstering health and hygiene awareness. Similarly, the Acceleration of Sanitation Development in Human Settlements (PPSP) Program which followed in 2009, emphasizes integrated sanitation planning in urban areas, including the expansion of both centralized sewerage networks and decentralized sewerage systems. In support of these initiatives, the Central Government is planning considerable infrastructure investments, including in the construction of septage treatment facilities.

Policy Environment. Decentralization Laws No. 32/2004 and No. 33/2004 clearly place the responsibility of sanitation services in the hands of local government, making their leadership and support critical as the country strives to meet the Millennium Development Goals. While infrastructure development and administration was largely centralized prior to the fall of Suharto—with large projects planned, funded, and implemented by the central line ministries such as the Department of Public Works—these critical functions now fall to the country's roughly 400 regencies (or kabupaten) and 100 cities (or kota). Indeed, more than half of all public investment is now carried out by local governments, with the fiscal balance only expected to continue to shift towards the district level (World Bank, 2007).

In terms of specific policies pertinent to centralized wastewater treatment, Environmental Health Ministerial Decree No 112/2003 (*Keputusan Menteri Negara Lingkungan Hidup Nomor 112 Tahun 2003*) provides the basic guidelines to the management and treatment of domestic wastewater. More specifically, the regulation requires individual or centralized treatment for wastewater from domestic real estate, restaurants (more than 1000 m2), offices, small businesses, apartments and boarding houses (more than 100 habitants), setting forth specific effluent standards (in terms of pH, BOD, etc.). Enforcement of this decree, however, is nonexistent. (Environmental Services Program, 2006). Additionally, there is no national law requiring that premises connect to centralized wastewater systems when it is available.

When it comes to decentralized systems, regulations and guidelines from the national government are equally limited. The Ministry of Public Works, for example, does possess a Standard Code for the Planning of Septic Tanks. The Code sets forth the required construction materials, design specifications, location recommendations, and permissible ratio of users per given tank volumes. The Code also recommends that single family septic tanks be emptied once every three years (AECOM and EAWAG, 2010). Unfortunately, there is little evidence that septic tanks are built to code, and no agency is charged with actually enforcing the code.

Given the relatively weak policies promulgated by the national government, then, local governments are given broad discretion over the regulation of wastewater treatment and disposal. While a handful of municipalities have proactively taken initiative and enacted local statutes concerning wastewater and sludge management, the vast majority are yet to fill the regulatory vacuum.

Infrastructure Financing. Similar to the previous case studies, investment in sanitation infrastructure has been led by the central government. Indeed, nearly all of the current centralized wastewater treatment plants in Indonesia were funded by the central government, usually utilizing loans from multilateral financing institutions such as the World Bank or the Asian Development Bank (Environmental Services Program, 2006). Similarly, the central government also financed the

majority of septage treatment plants across the country, although many of these plants are no longer functional (AECOM and EAWAG, 2010). While the use of multilateral donor financing has sharply declined over the last decade (as the Ministry of Finance has emphasized the use of domestic financing as much as possible), the central government remains a significant source of financing for new sanitation infrastructure. The Ministry of Public Works, in particular, frequently invests in sanitation projects by channeling grants through the Special Allocation Fund. In this regard, the Ministry is currently planning a multi-million dollar investment over the coming one to two years in the rehabilitation and construction of septage treatment plants across the country.

In terms of incentivizing local governments themselves to support the development of the sanitation sector, it is notable that many central government grants are conditional upon (1) the preparation of supporting documentation (such as City Sanitation Strategies) and (2) a co-investment by the municipality itself[16]. While local investment does appear to be modestly increasing in recent years, it remains far below the amount of resources required by the sector. A recent analysis of 29 local government budgets by USAID's Indonesia Urban Water Supply and Sanitation (IUWASH) Project, for example, indicated that local governments governments generally allocate far less than 1% of the total budget to sanitation investments.

Services Pricing. Determined by the local government entity, tariffs and fees for wastewater services in Indonesia are generally set below cost recovery. Indeed, of the nine cities with centralized treatment plants, only two (Bandung and Jakarta) have historically recovered their operations and maintenance costs plus depreciation. The types of tariffs used vary across the cities and include both proportionate and fixed structures. The table below provides a brief summary of the types of tariff systems used across theses cities, as well as the approach utilized to collect customer bills.

Table 7: Tariff and Billing Approach for Centralized Systems

City	Operator	Tariff Type	Billing	Collection Efficiency
Bandung	Water Utility	Variable: 30% of water bill (for all customers, w/ and w/o sewerage connection	Included in water bill	80%
Banjarmasin	Water Utility	25% of water bill	Included in water bill	86%
Balikpapan	Water Utility	Fixed Fee	No regular billing	No data
Cirebon	Water Utility	Variable: Captured within water charges	Included in water bill	No data
Jakarta	Wastewater Utility	Fixed Fee (but fee varies per customer based on home size)	Separate bill	60% - 80-%
Medan	Water Utility	Fixed Fee (but fee varies per customer based on home size)	Together with water bill	97%
Solo	Water Utility	Fixed Fee	Separate bill	15%

[16] This is usually on the order of 10% of the total grant provided by the central government.

City	Operator	Tariff Type	Billing	Collection Efficiency
Tangerang	Municipality	Fixed Fee	No regular billing	No data
Yogyakarta	Municipality	Fixed Fee	Separate bill	80%

Source: (Environmental Services Program, 2006)

In terms of septage charges, there is a significant amount of variation from one locale to another. Generally speaking, however, the treatment plant operators themselves—whether it is the water utility or the local government—are not directly carrying out the pumping and hauling functions, but rather these are performed by private companies. The fees charged to the household for this service range from $5 USD to $27 USD. Operators then charge hauling companies a tipping fee when they dispose of the septage at the treatment facility[17], with such fees on the order of $0.27 to $0.54 USD per cubic meter (AECOM and EAWAG, 2010). This approach is somewhat different from that discussed under the US case study wherein Montgomery County and Fairfax County elected to charge substantive licensing fees up front to cover their costs and then forgo tipping fees at the plants themselves.

Not surprising, Indonesia has struggled with the illegal dumping of septage. With cash already collected from the household and a loose to nonexistent regulatory environment, private operators possess little incentive to actually deliver the septage to the plant. The World Bank's Water and Sanitation Program and USAID's IUWASH Project are currently collaborating with the Ministry of Public Works to consider changes to this approach, such as including the cost of septage services within the water bill in a manner similar to the centralized wastewater treatment facilities above. One of the challenges with this approach, however, is that, in cities with low piped water coverage, a separate, parallel billing approach would be required for households that are not existing customers of the water utility.

Bandung City, West Java

The provincial capital of West Java Province, Bandung is home to approximately 2.5 million people. As noted above, Bandung is one of nine cities in the country with a centralized sewerage system. The system—which is owned by the municipality and operated by the water utility—serves approximately 30% of the city's residents. Overall, it is one of the best operated sewerage systems in the country, thanks in large part to its tariff, which is equal to 30% of the water bill for every water utility customer. Interestingly, water customers are charged the additional 30% sewerage fee regardless of whether or not they are actually connected to the sewerage system (Environmental Services Program, 2006). According to Regulation No. 937/2009 from the Office of the Mayor of Bandung, however, such customers are supposed to receive regular desludging services every two years. Unfortunately, while this fee system does engender revenue sufficiency, it does not incentivize the utility to expand access to new customers, as doing so would only incur additional costs without bringing in additional revenue. It is no surprise then, that as of 2006 the plant was only operating at less than 30% capacity.

In addition to operating the centralized treatment plant, the utility also plays a role in managing the waste from on-site systems. As noted above, water utility customers who are not connected to the

[17] Septage is treated at both wastewater treatment plants as well as at septage treatment plants.

sewerage network are supposed to receive desludging services every two years at a minimum which, theoretically, is paid for through the 30% surcharge on their water bills. To carry out this service the utility manages a small fleet of septic tank pumping trucks to clean customer septic systems, as well as engaging a number of licensed private operators. All trucks empty the septage collected directly into the sewer main, meaning that it is ultimate treated at the aforementioned plant. While this practice—which was also noted in Farifax, Virginia—cuts down on the need for haulers to transport septage long distances, it can also cause problems within the sewerage systems itself given that it was built for wastewater as opposed to more concentrated septage (AECOM and EAWAG, 2010). Mayoral Regulation No. 937/2009 also states that the water utility will service non-customers "for a fee," but the nature of this fee is unclear.

Notably, in 2011 the utility entered into a partnership with Malaysia's Indah Water Konsortium to improve its septage management capacity. IWK performed an assessment of Bandung's operational and technical capacity and conducted both a hands-on training with the utility as well as hosting a study tour to its facilities in Malaysia (Waterlinks, 2011).

Malang City, East Java

With a population of approximately 800,000 people, the City of Malang is one of the largest urban centers in the Province of East Java. Situated in the Province's highlands, Malang is considered one of the more progressive municipalities in Java in terms of its infrastructure and public services. It water utility, for example, is regarded as a professional, well-run operation, with a coverage rate of over 75% of the city's population. In terms of sanitation, Malang has embraced recent government initiatives to bolster the provision of basic sanitation services, developing a Citywide Sanitation Strategy in accordance with government guidelines. Concerning domestic wastewater, the City currently operates one septage treatment plan, one wastewater treatment plant (in cooperation with a neighboring district), six communal septic systems, and six public bathing and toilet facilities (Ministry of Public Works, 2003).

While the City's aggressive plan's to improve the management of wastewater and septage are very much a work in progress, Malang has, notably, already take concrete steps to bolster its policy environment. More specifically, in 2008 the local parliament passed District Law No. 1/2008 regarding the "Management of Septage and Wastewater" (Government of Malang City, 2008). Pertinent provisions within this law include the following:

- All entities that intend to engage in the removal and transport of septage must obtain a license from City authorities. Licenses must then be renewed every two years;
- All septage must be disposed in the designated treatment facilities—all other locations are prohibited;
- The issuance of licenses and the disposal of septage at facilities are subject to levies (tariffs) by the local government.
- When setting the tariffs, the local government shall take into consideration the cost of the services (including oversight, development, and control of those services), the affordability of the services, the fairness of the charges, and the broader policies of the municipality;
- The business license for services related to the removal and transportation of septage shall be subject to a tariff of 25,000 Rupiah.

- The fee for the disposal of septage at the prescribed public facilities will be 10,000 Rupiah per tanker truck. The fee for the disposal of wastewater (sewage) at the prescribed public facilities will be 20,000 Rupiah per tanker truck.
- Individuals or businesses in violation of the regulations included in the law may be fined up to 50 million Rupiah or serve up to six months in prison.

Case Study Take-Away Points

In terms of applying the approaches and lessons from the Indonesia case study above, key take-away points are as follows:

- ✓ The centralized, top-down investments undertaken by the Government of Indonesia during the 1990s—particularly in the area of septage treatment—have largely been unsustainable as local government units have not possessed the capacity nor the resources to operate these systems;
- ✓ Those utilities that have combined the sewerage bill with the water bill have generally had higher billing efficiencies;
- ✓ By charging septage fees at the time time of disposal at the treatment plant, haulers face a disincentive to bring waste to the plant and frequently resort to illegal dumping.

Chapter 4: Sanitation Pricing in the Philippines

Moving from the broader consideration of international experience in sanitation pricing, Chapter 4 turns to the specific context of the Philippines. To begin, we consider the current pricing paradigms in the Philippines in terms of the underlying regulatory and policy framework. In the second subsection, we then look at how four local governments—Dumaguete City, Alabel Municipality, Metro Manila, and Baliwag Municipality—have implemented this framework to date.

4.1 – THE CURRENT PRICING PARADIGM

Before delving into the analysis of potential sanitation pricing approaches, it is first necessary to highlight pertinent aspects of the regulatory and legal framework in the Philippines, as well as to consider the pricing approaches already adopted by the more proactive municipalities and water districts. In this regard, while the international case studies presented above may inform the development of sanitation pricing standards and guidelines, what ultimately matters is that the selected approach is viable within the Philippines context. As such, it is critical to learn from and build upon locally tested methodologies to the maximum extent possible.

National Legal Framework

National policy in regarding water sector pricing is articulated, first and foremost, through the statutes passed by Congress and signed by the President. Table X below provides a summary of the four most important statutes, including excerpts from specific sections of the respective laws pertinent to water sector pricing. Given their sector focus, Presidential Decree 198 of 1973 (as amended) and the Clean Water Act of 2004 are worthy of additional analysis.

Presidential Decree 198. As noted in the table, Presidential Decree 198 sets forth the broader legal basis for the formation of water districts as a means to deliver both water and wastewater services to the public. Chapter IX of the the Decree specifically addresses issues related to water sector pricing in the Philippines, including the following pertinent points:

- Section 37 sets forth the basic design criteria for water sector rates more broadly. Specifically, the Section notes that WDs shall set rates that provide for (a) the reimbursement of installation costs, and (b) revenue sufficient to cover operating and maintenance approaches, and a "reasonable surplus" to cover routine replacements and improvements. Additionally, this clause also notes that the established tariffs must further provide the revenues necessary to, "pay the interest and principal and provide a sinking fund for the payment of debts of the district as they become due and establish a fund for reasonable reserves." While this Section is directed towards water supply services, it nonetheless provides relevant principles for sanitation pricing as well.
- Section 38 empowers WDs to "prescribe and collect rates and other charges for sewer services furnished" including what are termed "stand-by" or "availability" charges for instances when sewerage is available but no connections are made.
- Section 38 also permits WDs to collect sewerage fees as part of the water bill. Importantly, it empowers utilities with the option of discontinuing "any and all services for which such bill is rendered, including water," should the customer fall into arrears. This allows the

utility, then, to make a tangible link between water and sanitation billing, which is clearly a best practice when it comes to bolstering collection rates for sanitation services.

- Section 40 provides more detailed guidance on the the determination of "standby" or "assessment" charges whose prime intent is to obtain infrastructure financing. Notably, the clause states that such charges may be based upon the "length of property counting upon the proposed improvement or, in terms of the area contained within the boundary of said property." This type of charge is akin to the "front foot" and "system development charges" discussed under Chapter 2.

While the above clauses do not specifically mention septage management, it is noteworthy that Chapter VII of the Decree—which sets forth the powers of water districts—broadly defines what constitutes sewerage services. Specifically, Section 28 notes, "A district may require, construct, operate and furnish facilities and services, within or without the district, for the collection, treatment and disposal of sewerage, waste, and storm water." Thus, the principles outlined under Chapter IX may indeed be reasonably interpreted as relevant to how a water district approaches the pricing of septage management services, including the notion that such fees may be collected in conjunction with the water supply services.

The Clean Water Act. Passed in 2004 under the Arroyo administration, the Clean Water Act—the full title of which is the "Act Providing for a Comprehensive Water Quality Management and for Other Purposes"—describes the GOP's overall policy of pursuing sustainable economic development in a manner consistent with "the protection, preservation, and revival" of the nation's waters. While the terms of the Act are relatively general (see Table X below) and thus do not delve into the details of pricing approaches, Section 7 does make important provisions for the utilization of the property tax as a potential source of revenue for the sewerage and septage management sector. Specifically, the clause states that, "Each LGU may raise funds to subsidize necessary expenses for the operation and maintenance of sewerage and septage facility servicing their area of jurisdiction through local property taxes and enforcement of a service fee system."

The explicit inclusion of the property tax as a means to "piggyback" septage management fees has potential implications for the overall financing approach for septage in that, presumably, areas outside the service area of the water district should be paying similar amounts for septage services. Thus, ideally, the pricing approach adopted by the water district of a given municipality would be implemented in parallel by the LGU for areas outside the WD's service area. In this regard, the implementing rules and regulations for Section 8 of the Act leave the institutional arrangements for septage management to the discretion of local authorities, stating that, in areas where no sewerage services exist, either the LGU or the water district may take the lead in services implementation.

Table 8: Legal Framework for Sanitation Pricing in the Philippines

Statute	Description of Applicable Clauses
Philippines Constitution (1987)	▪ Requires and empowers the State to "protect and promote the right to health of the people, and instill health consciousness among them" (Article 2, Sec 15);
Philippines Local Government	▪ The LGU is required to promote the health and safety of its residents (Sec 16); ▪ The LGU shall provide basic public services and facilities, including

Statute	Description of Applicable Clauses
Code (1991)	"environmental management systems and services or facilities related to general hygiene and sanitation (Sec 17).
Presidential Decree 198 (1973)	▪ Establishes the overall legal framework for the formation of water districts to provide water supply and sanitation services, as well as for the formation of the Local Water Utilities Administration (LWUA) to regulate/oversee the activities of water districts; ▪ Empowers WDs to charge rates for water supply that allows the district to recover its costs, pay its long-term debts, and allow for a "reasonable surplus for replacement extension and improvements" (Sec 37); ▪ Empowers WDs to "prescribe and collect rates and other charges for sewer services furnished" as well as "fix, levy and collect a sewerage and water service stand-by or availability charge in the event sewer service is available and no connection is made" (Sec 38); ▪ Requires WDs to conduct public hearings prior to the enactment of a new rate schedule (Sec 63).
Clean Water Act (2004)	▪ Articulates an overall policy of pursuing sustainable economic development in a manner consistent with "the protection, preservation, and revival" of the nation's waters (Sec 2); ▪ As part of the implementation of water quality management systems, empowers LGU's to finance sewerage and septage through the property tax as well as a "service fee system" (Sec 7); ▪ Empowers the Department of Environment and Natural Resources to establish a wastewater permitting and charge system that takes into account the "net waste load" of effluent (Sec 13); ▪ Establishes fiscal and non-fiscal incentives for LGU's and WD's to develop and undertake effective water quality management" (Sec 26.); ▪ Clarifies that, in cases where WDs, water utilities, and LGU water works are already in place, the "water supply utility provider shall be responsible for the sewerage facilities and the main lines pursuant to Presidential Decree No. 198 and other relevant laws. In areas where there are no existing facilities, the LGUs, water districts or water utilities may adopt septage management program or other sanitation alternatives." (Rule 8.6)

National Water Sector Pricing Policies

Building off the legal framework above, key national regulatory bodies have developed more detailed policies and guidelines concerning the pricing of water sector services. While these policies and guidelines largely pertain to water supply, we can nonetheless garner important underlying economic principles from these policies that are applicable to the pricing of sanitation services as well. Further, given the potential to link the calculation of septage rates to water consumption and rates, it is important to understand the methodologies utilized to develop the water supply pricing framework.

Local Water Utilities Administration. As the key regulatory body overseeing the operational and financial performance of Water Districts, the Local Water Utilities Administration (LWUA) plays an important role in the determination of how water supply tariffs are structured. To inform the rate-making process, in 2000 LWUA published its "Manual on Water Rates and Related Practices,"

which sets forth guidelines to develop and calculate connection charges and water rates, project cashflows, adjust rates, and conduct public consultations throughout the rate-making process (LWUA, 2000). While it is beyond the scope of this study to provide a detailed analysis of this process, the following issues addressed within the Manual are pertinent as we consider an approach to sanitation pricing.

- *Full-Cost Pricing*. LWUA makes it clear that tariffs should be set based on the full cost of providing water supply services. Indeed, the Introduction to the Manual states that, "Full-cost pricing, meaning setting a price per unit of water that covers all the costs involved in treating water and delivering it to the customer, is the fairest way of charging for water" (pg. 2). Underlying the need for full-cost pricing, of course, is the objective that revenues are adequate to meet the utility's revenue requirement. It is therefore safe to assume that LWUA would ascribe to a similar approach when it comes to the pricing of septage services as well;
- *Affordability*. While LWUA stresses full-cost pricing, it also notes that rates should still be affordable for low-income groups. In order to measure affordability, the Manual states that, "the minimum charge for 1/2" residential connection should not exceed 5% of the average income of the LIG in the service area" (pg 4). While sanitation costs are not explicitly mentioned here, in order to be conservative, it is reasonable to utilize this benchmark for the entire bill from a water utility, including any charges associated with septage management. Indeed, based upon the Philippines Family Income and Expenditure Survey, combined household expenses for water, fuel, and electricity, account for about 7% of total family costs, implying that the 5% level could still accommodate sanitation costs.
- *The Cash Needs Approach to Revenue Requirements*. The determination of the utility's revenue requirements is based upon the cash needs approach. As noted in Chapter 2, the cash needs approach means that revenue needs are based upon the cash flow statement, and do not incorporate non-cash expenses such as depreciation or a financial return on investment. While the adoption of the cash needs approach for the pricing of septage services may make the most sense from a practical stand-point, we must also consider the extent to which the WD will provide these services beyond its immediate service area, which may lend itself to the more business-oriented utility approach. This topic is discussed in greater detail in the following section.
- *Volume-Based Pricing*. As much as possible, LWUA advocates for volume-based pricing, noting that "charging for water in proportion to the amount and characteristics of use…is more equitable than on a flat basis" (pg. 10). Notably, in instances where volume-based pricing is not practical, LWUA promotes the use of other physical features as a proxy for volume such as number of residents, number of rooms, number of plumbing fixtures, or square meters of the house. Given the complexities associated with measuring the volume of septage, these types of characteristics may ultimately emerge as the most realistic way of pricing septage services.
- *Cost Distribution across Customer Classes*. To engender equity in rate-making, LWUA also notes that importance of dividing customers into classes based upon their "water-use characteristics" (pg. 17). While septage-use characteristics are likely fairly homogeneous across residential customers, this is an important principal to bear in mind when it comes to the pricing of septage treatment for commercial or industrial customers, which are likely to produce more sludge with a greater concentration of pollutants.

- *Public Consultation*. Finally, in accordance with the legal framework, LWUA emphasizes the importance of public consultation such that the WD can inform its constituency regarding a "proposed water rate increase and the justifications appertaining thereto" (Pg. 38).

The National Water Resources Board. The National Water Resources Board (NWRB) serves as the GOP's coordinating body for the nation's water resources. As part of this function, the NWRB acts as the regulator for water utilities nationwide, with a specific focus on privately operated water utilities.[18] In this capacity, the NWRD has also promulgated pertinent pricing policies. While of these policies complement those of LWUA above, several notable distinctions are as follows:

- *Rate of Return Approach to Revenue Requirements*. The NWRB has adopted a rate of return approach (i.e. the "utility approach") to the determination of revenue requirements. As such, they do not include debt service requirements (principal payments) within the calculation, but rather incorporate depreciation costs and a maximum return of 12% (PWRF-SP, 2010). Given that the NWRB works closest with privately operated utilities, this more business-oriented approach makes sense by clearly identifying the allowable return on investment for the private sector.
- *Establishment of a Depreciation Reserve Fund*. Building on the above, the NWRB advises utilities to establish a reserve fund from their depreciation line item to finance, "major improvements, new constructions, extensions, or additions to the property of the utility" (NWRB, 2007).
- *More Generic Customer Classes*. The NWRB considers all customers as "residential" unless their usage patterns vary significantly enough that the creation of a separate category is necessary. In other words, even a business may be classified as residential if its usage characteristics are relatively similar to households.
- *Greater Standardization.* Finally, the NWRB requires utilities to utilize a standardized number and volume of quantity blocks, meaning that the rate structure is somewhat less flexible than the LWUA. Also, structure in increasing block rates ascribed to by the Board generally leads to more progression pricing, resulting in a higher tariff for more consumption (PWRF-SP, 2010).

As part of its "Economic Regulatory Guidelines," the NWRB also provides a detailed enumeration of the fundamental responsibilities of the water utility, a customer service code, and key performance indicators. Notably, under the responsibilities of the utility, the Board includes the "Right to a Healthy Environment." More specifically, the NWRB states that, "Individual customers and society as a whole shall be protected from certain environmental risks such as pollution (associated with the use of the water utility's assets) and degradation (from development of additional water resources due to limited supply)" (pg. 13). Such a policy provides a strong foundation for the involvement of water service providers in the provision of sanitation services as well, thereby helping to ensure that the water they supply is, following use, disposed of in a hygienic and sustainable manner.

[18] The NWRB does, however, handle appeals requests from Water Districts that disagree with rate decisions from LWUA.

4.2 - EXAMPLES OF EXISTING SEPTAGE PRICING PROGRAMS

Section 4.2 moves to the local level to consider how three different municipalities / water districts have thus far applied the above legal framework. Given the decentralized governance structure of the Philippines, LGUs have considerable discretion in the ultimate determination of how national sanitation policies are implemented. Indeed, it is often at the local level where we see the most innovative practices as LGUs search for practical solutions to the common challenge of improved septage management.

Dumaguete City

The City of Dumaguete is considered a leader in septage management in the Philippines, as one of the first LGUs to operate a jurisdiction-wide maintenance program for septic tanks. In operation for approximately two years, the septage treatment facility (SpTF) cost approximately PhP 25 million to construct, with the capital expenses shared equally by the LGU and Dumaguete City Water District. The 80 cubic meter capacity plant is non-mechanized, meaning that it relies fully on natural processes to breakdown incoming waste (Villanueva, 2012).

Septage Management in Dumaguete City	
Services Provided:	- Scheduled desludging every 3 years and septage treatment; - 25,000 households served
Facilities:	- Non-mechanized SpTF with 80 cubic meter/day capacity; - Two (2) vacuum trucks
Operator:	- Water District
Local Policy Framework:	- Ordinance No. 18 / 2006
Pricing Approach:	- Uniform price per cubic meter of water consumed.
Pricing Details:	- WD Customers: PhP 2 / cubic meter; - Non-WD Customers: PhP 1,200 fee for service;
Comments:	- Revenue-sharing agreement between WD and LGU.
Sources: (Villanueva, 2012)	

The SpTF is operated fully by the WD as a ring-fenced, public enterprise. While the WD was originally envisioned to serve only as the collections agent, subsequent negotiations between the LGU and the WD resulted in the daily operations being turned over entirely to the Water District, inclusive of the household collection services. To facilitate the oversight of septage services, the WD formed the City Septage Management Group, which includes representation from both the WD and the City. Notably, the WD has about 90% coverage of the population within the 30 barangays that make up its franchise area. Such extensive coverage is, of course, quite rare across the Philippines, where average WD coverage in urban areas tends to be on the order of 50% to 60% of the franchise area.[19] Since the commencement of operations, the WD has serviced approximately 7,000 of the 25,000 residential households that are connected to the utility. Henceforth, all customers are scheduled to receive desludging services every three years.

The septage services pricing approach utilized by the water district in conjunction with the local government unit is characterized by the following (Villanueva, 2012):

[19] Note that, with the exception of several of the major metro areas in the Philippines (such as Metro Cebu), the franchise area of the water district approximates the jurisdiction of the respective local government unit.

- The Dumaguete City Water District bases charges on the volume of water consumed by its customers, charging **PhP 2 per cubic meter of water consumed**. There is no cross subsidy for those that consume lower volumes of water. This means that, a customer consuming 10 cubic meters of water per month would pay approximately PhP 720 to have their septic tank desludged every three years, while a more "average" customer that consumes about 20 cubic meters per month would pay PhP 1,440 per service. This pricing approach was determined based upon a study performed by the USAID-assisted Philippine Sanitation Alliance Program;
- If a customer chooses to avail of the desludging service prior to the scheduled time (i.e. earlier than 3 years), the customer must pay PhP 1,000 per trip provided that it is located within the jurisdiction of the City;
- Households located within the jurisdiction of Dumaguete City who are not connected to the Water District pay a flat rate of PhP 1,200 per trip. These households do not receive scheduled service, but rather are served on a demand-driven basis;
- For larger commercial customers such as a hotel that are not connected to the piped water system, WD simply estimates of the likely volume of consumption and charges the client based on this estimate at a rate of PhP 2 per cubic meter to desludge their septic system;

While the WD received some complaints on the above form of pricing when it was initially introduced, it has generally been accepted by the customer base at this juncture. As the manager of the utility's Finance Division noted the pricing scheme is relatively straightforward: "the more water you use the more that you pay" (Villanueva, 2012). The utility does not have any evidence, however, that greater water consumption actually results in a greater amount of sludge produced and more, subsequently, a greater cost to the utility when it comes time for the desludging services. While no analysis to this end is planned, it would indeed be feasible given that the trucks used by the WD are able to measure the volume of sludge vacuumed from the septic tank at the time of servicing.

All service fees collected by the WD are deposited into a reserve fund that is wholly ring-fenced from the revenue flows associated with water supply. Notably, 80% of the septage revenues are used to fund the operations and maintenance of the system, while the remaining 20% is shared by the LGU and WD equally. Thus far, the Dumaguete City Water District has generated approximately PhP 3 million in revenues, and appears to be operating on a cost recovery basis. While the WD has not yet been providing the service for a sufficient period to perform extensive financial analysis, it is apparent that the operations and maintenance of the trucks consumes the greatest level of resources on a monthly basis. This conclusion may not be directly transferable to other septage management programs, however, given that the Dumaguete facility is non-mechanized.

On a final note, the issue of equity between customers and non-customers within the Dumaguete City represents one potential future challenge to the present rate structure. More specifically, WD customers utilizing more than 17 cubic meters of water will actually pay a greater amount per desludging service than their non-WD customers. While the proportion on non-WD customers within the franchise area is actually quite small, it will nonetheless come as a bit of a surprise to any presently non-customers who later obtain a connection due to expanded services and realize that

their cost for desludging has risen. As discussed in more detail in the following chapter, the inter-jurisdiction equity of rates among customers and non-customers is an important consideration in the development of a final rate structure.

Alabel Municipality

With a population of approximately 30,000 people, Alabel is a first-class municipality located in Southern Mindanao along the Sarangani Bay. Commencing operations in 2008, the Alabel Septage Treatment Facility possess a daily capacity of 60 cubic meters per day, and, like Dumaguete is wholly non-mechanized. The treatment facility itself was actually constructed as part of a JICA-financed program implemented by the Southern Mindanao Integrated Coastal Zone Management Project (SMICZMP) of the Department and Environment and Natural Resources (DENR). As such, the Alabel plant was built at no cost to the LGU, as were five other smaller plants constructed in neighboring municipalities (Malapatan, Glan, Maasim, Kiamba, and Maitum) in an effort to safeguard the waters of the Sarangani Bay. (Sustainable Sanitation in East Asia – Philippines Program, 2009).

Septage Management in Alabel Municipality	
Services Provided:	- Schedule desludging services; - Septage Treatment for 2,500 HH; - Acceptance and processing of waste from General Santos City.
Facilities:	- Non-mechanized SpTF with 60 cubic meter/day capacity; - Two (2) vacuum trucks
Operator:	- Local Government Unit
Local Policy Framework:	- Ordinance 2008/048
Pricing Approach:	- Flat Fee payable in installments or in a lump sum.
Pricing Details:	- See Table 6 Below
Comments:	- Customers for General Santos City play an important role in the financial viability of the SpTF.

Sources: (Sustainable Sanitation in East Asia – Philippines Program, 2009); (Rivera, 2012)

The management of septage waste in Alabel—including the operations and pricing associated with the SpTF—is set forth in Municipal Ordinances No. 2008-048 and No. 2010-058. Notably, the 2008 Ordinance mandates that (1) all buildings possess a viable septic tank that is built according to the prescribed specifications, and (2) all septic tanks are desludged every three years, at a minimum. While enforcement of these mandates is a separate issue, at the very least the Municipality has put in place a clear policy framework, thereby setting the stage for a sustainable septage management program.

In addition to the regulatory requirements, the ordinances also articulate the fee structure set forth in Table 6 below. There are three noteworthy characteristics concerning this structure. First, the cost of the septage charge is based upon a flat fee of **PhP 1,080 per desludging service**. Households can then amortize this cost over a three year period, paying PhP 35 per month, or, alternatively, PhP 360 per year. Notably, when structuring the costs, Alabel included: (1) operating and maintenance charges for the septage treatment facility, (2) operating and maintenance charges for septage collection (i.e. operating the vacuum trucks), and (3) depreciation on the vacuum trucks (using a 7-year, straight-line methodology). Regarding the latter cost item, depreciation charges were *not* included on the septage treatment facility itself, likely due to the fact that the plant was a grant to the LGU.

Second, volumetric considerations included in the pricing framework only concern the amount of sludge generated and are not related to the volume of water consumption. This is not surprising

given that the plant is operated by the LGU itself, and thus does not have data on water consumption. Further, volumetric pricing only comes into play when households exceed a certain threshold of septage—generally 5 cubic meters. It is quite rare that a typical household would have more sludge than 5 cubic meters, as most septic tanks are themselves 5 cubic meters and would generally only hold about 3 cubic meters of sludge at any one time. Thus, the flat fee is inclusive of all fixed and variable costs up to a volumetric ceiling of 5 cubic meters. Notably, however, when performing the pricing analysis for the desludging services, the unit of analysis used by Alabel was the cost to treat a single cubic meter of septage waste.

Finally, Alabel charges significantly more for "external" customers, or those that live outside the bounds of the political jurisdiction. This makes sense given that: (1) such customers do not contribute to the tax base of the jurisdiction and thus are not "citizen-owners" of the Alabel treatment facilities; (2) there are generally greater transportation costs to serve external customers; and (3) there is also greater risk associated with serving clients in another political jurisdiction. Regarding this risk, external customers generally represent less dependable customers given that they could eventually stop using the Alabel treatment plant and avail of septage services from another provider, particularly if their own jurisdiction constructs a septage treatment facility at some point. Importantly, setting an economically efficient rate for external customers is particularly important for Alabel given that their "internal" customer base of less than 2,500 septic tanks is insufficient to exploit the full capacity of the plant and cover its operating costs. This point is vividly illustrated by the fact that the services provided to General Santos City accounted for approximately half of the revenues for the treatment facility in 2010 (Rivera, 2012).

Table 9: Alabel Septage Management Fees

Customer Type	Fee Structure
Alabel Customers	▪ Residential: P 1080 per household or P 360.00/year or P 35.00/month, and an additional payment of P 180/cubic meter in excess of 5-cu.m; ▪ Commercial /Industrial Establishment: P 1,800 per establishment or P 600/year or P 60.00/month, and an additional payment of P 360/cubic meter in excess of 5-cu.m; ▪ Institutional (churches, schools, etc): Same as residential
General Santos City Customers	▪ Residential: P 3,000/household and an additional P 500/cubic meter in excess of 5-cu.m; ▪ Commercial /Industrial Establishment: P 3,500/household and an additional P 650/cubic meter in excess of 5-cu.m; ▪ Institutional (churches, schools, etc): P 500/ cubic meter.
Customers Outside Alabel and General Santos	▪ Residential/Institutional: P 3,000/household plus roundtrip transportation costs, and an additional P 500/cubic meter in excess of 5-cu.m; ▪ Commercial: P 3,500/household plus roundtrip transportation costs, and an additional P 650/cubic meter in excess of 5-cu.m.
Private Desludging Companies	▪ P 250 per cubic meter tipping fee.

One of the principle challenges face by the Municipality has been to arrangement of payment mechanisms. While the use of monthly installments is easier for households to manage financially

and also results in a more dependable revenue flow for the LGU, it is difficult to collect on a practical level when not attached to another billing mechanism, such as the water bill. To address this, two actions have been taken by the Municipality to date. First, the mayor recently issued an Executive Order whereby the mandatory desludging of LGU employee's septic tanks can be paid either monthly or yearly via a direct payroll deduction. Second, septage fees for commercial establishments are paid on a yearly basis at the time of business permit renewal. More "typical" households, however, generally pay the desludging costs through the Municipal Treasurers Office in a lump sum following the completion of the service. According to the Municipal Environment and Natural Resources Officer, however, Alabel is exploring alternative collection vehicles such as the incorporation of the septage fee into the water bill for those communities served by the LGU-operated water system (Rivera A. , 2012).

Metro Manila

The Metropolitan Waterworks and Sewerage System (MWSS) that covers the greater Manila area is operated by two private concessionaires—Manila Water Company Inc (MWCI) is the concessionaire for the east zone while Maynilad Water Services, Inc. (MWSI) covers the west zone. In addition to water supply services, both operators also provide sewer and septage management services in their respective service areas. MWCI, for example, has expanded piped sewerage coverage to 12 percent in recent years, as well as constructing two septage treatment plants with a total capacity of 1,400 cubic meters per day, which is sufficient to treat the septage of its entire concession area. Further, the utility provides desludging services directly utilizing its fleet of about 80 vacuum tankers; these services covered 81% of the franchise area in 2011. Similarly, MWSI operates its own 500 cubic meter septage treatment facility and provides desludging services using its fleet of approximately 25 vacuum trucks and seven dewatering units (PWRF-SP, 2010). MWSI had a desludging service coverage of about 48% in 2011.

Septage Management in Metro Manila	
Services Provided:	- Schedule desludging services by both concessionaires every 5 years;
Facilities:	- MWCI: 2 mechanized SpTF with 1,400 m3/day capacity and 80 vacuum trucks; - MWSI: 1 mechanized SpTG with 500 m3/day capacity and 25 vacuum trucks
Operator:	- MWSS Concessionaires (Manila Water and Maynilad)
Local Policy Framework:	- Concession Agreements
Pricing Approach:	- Percentage of water bill
Pricing Details:	- Both MWCI and MWSI charge a 20% fee on water charges.
Comments:	- The environmental fee is the same for both sewer and septage customers

Sources: (PWRF-SP, 2010); (Rivera G. G., 2012)

The pricing of sanitation services for both concessionaires is based upon the volume of water consumed. More specifically, all MWCI and MWSI customers—regardless of whether they are connected to sewerage network or not—are charged an "environmental fee" equal to 20% of their water bill. This fee is defined by MCWI as "a charge for the mitigation of environmental impacts in the course of water conveyance, treatment and distribution and wastewater operations." MWSI, on the other hand, defines the fee as "applicable to all services to cover desludging of septic tanks and other environmental cleaning costs." There are no additional charges for residential customers that are connected to the sewerage network; however, some classes of sewered commercial customers are charged an additional 20% (for Maynilad) to 30% (for Manila Water).

Notably, this rate structure has changed dramatically over the years. The environmental and sewerage fees were originally charged at 100% and 75% of water charge, respectively. During the 2008 rate rebasing for concessionaires, the environmental fee was decreased to 10% of the water charge and sewerage fee to 50%, without distinction of customer base (i.e. residential, semi-business, business) to further encourage connection to sewer lines. It was only during the most recent rate rationalization in 2012 that the environmental fee was fixed at 20% of the water charge and the sewerage fee dropped to 0% for residential and semi business customers (Rivera G. G., 2012).

While the Metro Manila case has been hailed as a success in terms of expanding access to sanitation services, it is important to note that the current fee structure is not clearly tied to the cost of the services received by customers. By eliminating of the sewerage fee for most sewerage customers and boosting the environmental fee for all customers, for example, the concessionaires have essentially shifted a portion of the sewerage costs to non-sewer customers. While there is no doubt that non-sewer customers should pay for desludging services, a 20% fee is considered steep based upon the septage rate studies performed by PWRF-SP. Further, water, environmental and sewerage charges are not ring-fenced by the concessionaires, and so it is currently impossible to clearly allocate costs accurately and determine the extent to which septage services, for example, are operated on a cost recovery basis. Therefore, although there is a tendency to view the 20% environmental fee as a benchmark for other utilities, the lack of clarity on the basis of this charge combined with the unique characteristics of the Metro Manila regulatory structure suggest that it is dangerous to assume that this fee structure is transferable to other utilities.

Baliwag Municipality

The Municipality of Baliwag is located in western Bulacan Province, approximately 60 kilometers outside of the Metro Manila area. Based on the 2007 census, the current total population is estimated to be approximately 140,000 people, or roughly 30,000 households (PWRF-SP, 2009).

The domestic water supply needs of the Municipality are met by the Baliwag Water District (BWD), which serves 100% of the 27 Barangays and 86% of the total population. The BWD is a professionally managed utility, with an admirable 18% rate of non-revenue water and 95% collection efficiency. The average consumption of the BWD's customers is approximately 20 cubic meters per month. Notably, the WD relies completely on groundwater resources to meet the daily needs of its customer base; no surface water sources, in other words, are currently relied upon for the raw water supply.

The Baliwag Water District began the process of developing a septage management program in 2009, under the auspices of a partnership with PWRF-SP. The need for improved septage management was obvious: with a complete reliance on groundwater, protecting the water table was of paramount importance to the future sustainability of the WD and the health of the community as a whole. In speaking with the WD, the staff directly classified their motivation as "environmental protection" (BWD, 2012). While exact numbers were difficult to come by, the BWD estimated that at least 70% of all households relied upon septic tanks for the management of domestic wastewater, with the regular maintenance and desludging of those tanks estimated to be minimal. Indeed, in a household survey conducted by PWRF-SP at the outset of the program, only 10% of households

indicated that they had ever desludged their septic tank, with 76% stating that they had not and the balance of 14% not providing a clear answer. (BWD, 2012)

The Baliwag WD has followed a methodical and well developed process towards the establishment of its septage management program. The key phases have thus far included: preparation of a feasibility study, signing of a memorandum of agreement with the LGU, enactment of a SB Ordinance, internal capacity building through a water operator partnership, and a public information drive. The initial preparation of the feasibility study was supported by PWRF, with the final result being the selection of a fully-mechanized plant as the most appropriate option for the needs of the Municipality. This was, in part, driven by practical concerns related to availability of land (given its proximity to Manila, Baliwag is densely populated) and desire to minimize public nuisances such as odor (PWRF-SP, 2009).

Close coordination with the local government in the form of, firstly, a memorandum of understanding, and, secondly, the enactment of formal legislation has been a critical element of the septage management program's development in Baliwag. Notably, the final Ordinance—No. 16 / 2009—mandates both the inspection of septic tanks by the LGU as well as regular desludging of every tank within the jurisdiction every five years. The Ordinance also sets forth the pricing mechanism, which is discussed in greater detail below. The Water District itself has also taken on the responsibility of conducting the inspection in order to help smooth the implementation process.

Septage Management in Baliwag Municipality	
Services Provided:	- Schedule desludging services every 5 years; - Mechanized septage treatment.
Facilities:	- Fully mechanized SpTF with a capacity of 30 m3 per day - Two desludging trucks
Operator:	- Baliwag Water District
Local Policy Framework:	- Ordinance No. 16/2009
Pricing Approach:	- Percentage of water bill (but embedded)
Pricing Details:	- 10% of the monthly water bill for all residential and commercial customers.
Comments:	- The septage fee will be embedded within the bill and thus will not be visible to the customer.

Sources: (BWD, 2012); (PWRF-SP, 2009)

The third element of the program development process was internal capacity building through the water operator partnerships (WOP) program. Supported by USAID's ECO-Asia program, the partnership included two visits to the Indah Water Konsortium (IWK) in Malaysia to study their approach to sustainable septage management (see case study above). The Managing Director of the Baliwag WD stated that this relationship was immensely helpful, giving them a well-rounded understanding of how to operate a septage management program. Baliwag will adhere to the IWK approach of directly operating both the treatment facilities as well as the desludging and hauling services. The WD believes it is better not to contract out the desludging services, as it is hard to regulate and oversee the work of private companies.

The final element of the program's development was the public communications campaign to introduce the concept of and need for a comprehensive, jurisdiction-wide septage management program. The information campaign covered all 27 Barangays, and included a series of public consultations. Overall, the BWD found that citizens were generally aware of the need for and importance of improved septage management for the municipality, as many had used (or currently

were still using) well water to meet their household needs, and were familiar with the pervasiveness of groundwater pollution. Not surprisingly, the central issue encountered during the public consultations was the impact on the WD's tariff. Following an in-depth explanation of the basis for the tariff increase, however, the BWD indicated that their customers generally seemed accepting of the proposed increase. According to the WD, one of the reasons that they did not encounter heavy resistance is that their water tariff is already one of the lowest among the surrounding jurisdictions. Indeed, the BWD noted that their combined water and septage charges would still be less than the water charges alone for many of the neighboring water utilities.

Concerning the current status of the Baliwag WD septage management program, the bidding for the septage trucks and septage treatment plant have been completed and the construction process is currently underway. Three bids were obtained for the tender process to construct the plant, although this was challenging given the inexperience of local firms in the design and construction of septage facilities. The total cost of the plant was approximately P60 million, and was financed through a loan with a local bank with an interest rate of 7% and a tenor of 10 years. While the new tariff structure will be implemented in June 2012, the fully mechanized septage treatment plant is not expected to be completed until October. Additionally, as of May, the septage hauling trucks—which were purchased from Malysia—were still in transit to the Philippines.

The pricing approach adopted by the Baliwag Water District is, to some extent, still evolving given that it has yet to be implemented. The key aspects of the approach that have been determined are as follows (BWD, 2012):

- Similar to the Metro Manila concessionaires, BWD adopted the "percentage of water bill" approach, meaning that the septage management charges will depend upon the volume of water consumed each month. More specifically, the BWD will charge **10% on top of the water tariff** to desludge tanks every **5 years**, which amounts to about 5,000 tanks per year. Given that the WD's monthly revenues currently average around PhP 8 million, this means that the PhP will yield additional revenues of about PhP 800,000 per month.
- Considering the average residential customer's usage, the WD calculated that the average monthly septage charge would be about PhP 20, or PhP 240 per year, or PhP 1,200 for each desludging service (assuming once in five years). Thus, the average amount per service is substantially less than the PhP 3,000 to PhP 3,500 that most private desludging operators currently charge.
- The same 10% surcharge will be added onto commercial bills as well, regardless of whether or not the WD provides septage services to that entity[20].
- Notably, the surcharge is essentially *invisible* to the customer in the bill itself, as it will be embedded within the water tariff as opposed to broken out as a separate line item. In other words, the current base tariff (for 10 cubic meters) is PhP 145, and will therefore increase to PhP 160 in June 2012.
- The WD utilized the cash needs approach to calculate the tariff, and all septage management revenues and costs will be ring-fenced to ensure that the service is operating on a cost-recovery basis. Thus, for the capital expenditures, the tariff is based upon the actual debt

[20] Many commercial and industrial entities operate their own septage treatment facilities onsite.

service (amortization) schedule in accordance with the utility's loan from a local commercial lender. The cash requirement also includes allowances for a reserve fund equivalent to three percent of the septage receipts.

According to the Water District, they opted to adopt the "percentage of water bill" approach because (1) it adhered to the "polluter pays" principle and, (2) it follows the precedent set by the Manila concessionaires which is currently the principle point of reference given that LWUA has not issued any specific guidelines concerning septage management pricing. Notably, the pricing approach for noncustomers within the franchise area (approximately 15% of the population) as well as for tipping fees for private desludging operators have not yet been determined[21].

While the Baliwag's septage management plan will not be fully realized until later this year, it is currently off to a strong start. The General Manager is keen to demonstrate that public companies can be just as efficient as private companies, and thus it is likely that the BDG case will serve as a good point of reference for other water districts interested to launch similar programs.

[21] The General Manager did note, however, that desludging fees for noncustomers are likely to "be higher" than for existing customers, adding that this would serve as an incentive for noncustomers to connect to the WD.

Chapter 5: Comparative Analysis of Pricing Options

Building from the basic principles of water sector pricing (Chapter 2), three international case studies (Chapter 3), and a summary of the current pricing paradigm in the Philippines, Chapter 5 examines the key pricing options going forward, both in terms of how water districts define revenue requirements for their septage management programs, as well as how these requirements are transformed into user charges. More specifically, the opening section (5.1) addresses several preliminary design considerations that emerged during stakeholder discussion for this study. The following three sections then walk through the key "decision points" that water districts and LWUA, as their regulator, must consider in the development of a pricing framework: how revenue requirements will be determined (5.2), how rates will be structured and calculated (5.3), and how bills will be issued and revenues collected (5.4). The final section (5.5) then summarizes the principle lessons and recommendations of the analysis.

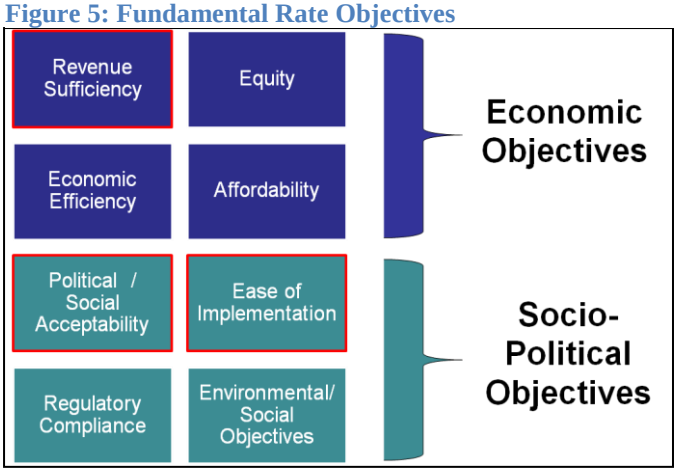
5.1 - SEPTAGE RATE DESIGN CONSIDERATIONS

Prior to examining the fundamental "decision-points" it is first important to consider several underlying design considerations that emerged through discussions with stakeholders during the preparation of this study in terms of the principles that tend to drive rate design in water districts as well as the unique challenge of a "transferability" that is inherent in the design of septage charges.

Fundamental Objectives

As discussed in section 2.1, rate design in the water sector has a number of economic and socio-political objectives, which are summarized in Figure 5. As the PWRF-SP team conducted stakeholder consultations specifically focused on rate design for septage management, the following objectives generally received the greatest consideration:

Figure 5: Fundamental Rate Objectives



- *Revenue Sufficiency*. There was a resounding consensus among stakeholders that septage management programs must be ring-fenced, financially viable enterprises for water districts. Indeed, according to PD 198, water supply revenues cannot be utilized to subsidize other WD activities (such as sanitation) unless the WD has already achieved complete coverage within its franchise area and an uninterrupted supply of water to all of its customers.
- *Political and Social Acceptability*. Whether or not ratepayers and their political representatives support a proposed rate structure also emerged as a decisive issue for septage pricing. This means that rates need to be easily explainable and fully justifiable to members of the LGU, the Sangguniang Bayan, and the public at large. One WD general manager

noted, for example, that success of a proposed septage management program would ultimately depend on the public hearing: "It is very important that this be accepted by the public."

- *Ease of Implementation*. Water districts and LGUs also cited the need for simplicity to facilitate implementation of septage rates. Billing and collections should, as much as possible, build on existing administrative systems and not require extensive modification of established procedures. It is not surprising, then, that "Piggy-backing" of current billing practices such as the water bill was highly favored by many stakeholders. The fact that Alabel is presently considering alternative billing mechanisms—including the water bill—confirms this finding.

The Importance of a "Transferable" Rate Structure

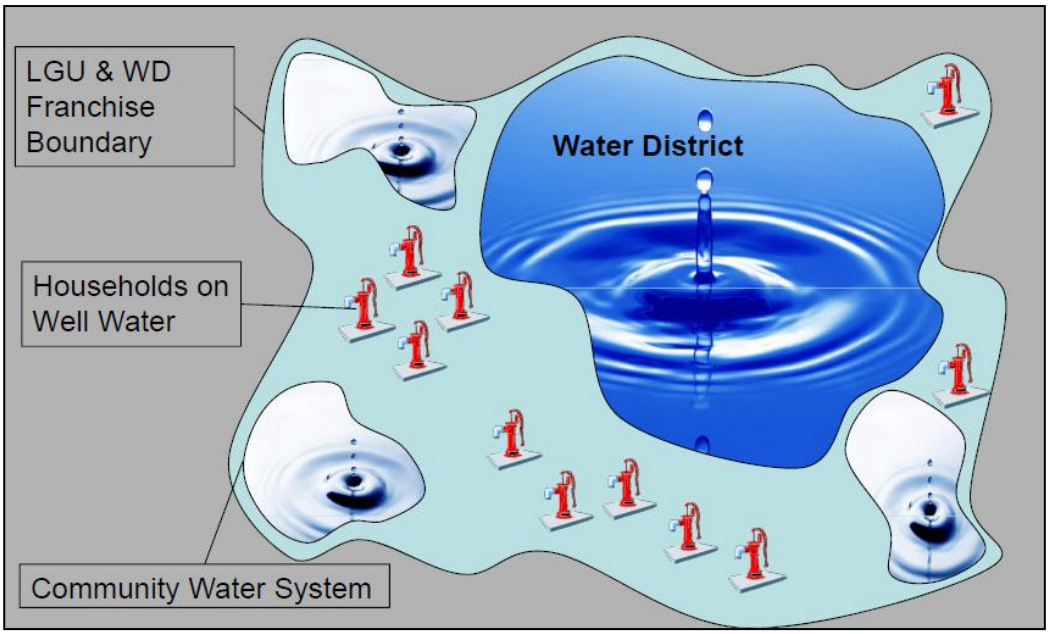
One of the principal challenges that emerged during the study to designing equitable rates for water districts is the development of a rate structure that is transferable beyond water district customers alone. As shown in Figure 6 below, water supply in any LGU is multi-faceted, with citizens obtaining water from a number of sources, including the WD, Barangay and community-based systems, private franchises, and shallow wells. The groundwater sources that underlie all these areas, however, are interconnected, and thus protecting these sources and maximizing benefits demands that septage management be implemented across the LGU, and, indeed, across the watershed. When developing septage rates, then, a WD must consider the following types of (potential) customers:

- *Resident water district customers*, or those households and businesses within the jurisdiction that presently have a metered connection to the water district (in the dark blue section of Figure 3);
- *Resident (or "internal") non-WD customers*, or those households and businesses within the local political jurisdiction that are not customers of the water district. Some non-customers may have deliberately chosen not to connect. A more likely scenario, however, is that the services of the local WD simply have not yet reached their property and they are using well-water or a community-based water system, as noted in Figure 6;
- *Non-resident(or "external") entities*, or those households and businesses that live or operate outside of the political jurisdiction (in the grey area in Figure 6), but are still interested to avail of a WD's desludging and treatment services; and
- *Private septage haulers* which may seek to empty their tanks at a WD's septage treatment facility.

As discussed in greater detail under Section 5.3, one of the potential issues associated with the use of a septage pricing approach based on the volume of water consumed by a household is that it is not easily applied to non-WD customers or non-resident. Thus, in order to maximize coverage of septage services across the entirety of the LGU, two parallel pricing structures will be required. While this may not be a concern for the limited number of WDs with 100% coverage across the LGU, the majority of districts only cover 50% to 60% of their franchise areas within the LGU. The bottom line then is that coordination with the LGU is critical to maximize the impact of a septage management program. This is not to say, however, that WDs need to wait for an LGU ordinance,

but simply that it is important to begin thinking ahead of time how a rate structure can also be applied to non-WD customers that reside within an LGU.

Figure 6: The Multi-Faceted Nature of Water Supply in an Illustrative LGU



5.2 - DETERMINING REVENUE REQUIREMENTS: CASH NEEDS VS. RATE OF RETURN

As discussed under Section 2.2, there are essentially two paths to the determination of revenue requirements for a water district's septage management program: cash needs and rate of return (also known as the "utility" approach). Based upon the focus group discussions held during the study and the national and domestic case studies highlight above, a continued reliance by water districts on the cash needs approach for septage pricing makes the most sense. That said, in order to ensure the sustainable expansion of septage management services, it is imperative to strengthen the "business case" for service providers, meaning that septage management services are operated as full cost recovery enterprises and are not subsidized by water supply services in any way.

In this regard, the business case for septage can be strengthened in four ways:

- First and foremost, septage management cost centers and revenue streams should always be ring-fenced from water supply accounts in order to ensure the accurate accounting of incoming and outgoing funds. Without ring-fenced accounts, it will be impossible to ensure that the program is being operated on a cost-recovery basis.
- Second, when defining the allowable cost centers under the cash needs approach, regulators should makes allowances for healthy operating and debt reserves, perhaps on the order of 8 to 10%. This will provide for sufficient liquidity to handle any unexpected cost over-runs or sudden spikes in demand, thereby ensuring that no subsidies are required from water supply revenues;

- Third, the inclusion of a sinking fund for vacuum trucks would help the utility prepare for the inevitable replacement of its fleet, which is anticipated to be every 7 years. This is, in many ways, similar to the approach utilized by Alabel, which has incorporated seven year, straight-line depreciation expenses specifically for the vehicles into its pricing structure;
- Fourth, WD's operating a septage treatment facility should be permitted to charge a premium to to clients availing of services from outside the political jurisdiction, or the "nonresident" entities discussed in the preceding section.

Expanding on the final bullet above, even though a WD may employ the cash needs approach to determine its overall revenue requirement, it is certainly possible to also incorporate elements of the rate of return (utility) approach for specific classes of customers. The Water Environment Federation notes that:

> When utility service is provided to non-owner customers, such as wholesale or retail service customers located outside the jurisdiction of the owner municipality, it may be appropriate to recognize return on plant value related to providing such service. In this instance, the utility basis for determining cost of service…is particularly applicable because it recognizes the costs and risks that utility owners must assume. As owners, the municipality or the utility is entitled to a fair return on the value of facilities devoted to serving non-owner customers. (Water Environment Federation, 2005)

Thus commercial pricing is more in order for these types of situations, where the relationship is between a provider and its customer, as opposed to a local government and its citizen. Borrowing from the ROR approach, then, a combination of depreciation expenses and a percentage yield representing a fair return on the rate base[22] could be charged to nonresident customers while still using the cash-needs approach for the septage management program as a whole. Such an approach would require, of course, determining the percentage of the plant in service that is dedicated to meeting the needs of nonresident customers and allocating costs accordingly. Given the additional effort required to make this determination, it only makes sense to make these calculations if the WD finds itself serving a substantive number of nonresidents, or at least 15 to 20 percent of its total customer base.

Notably, all additional revenue flows above O&M and capital expenses resulting from the "premium" charged to nonresidents should then benefit the residents themselves. More specifically, plausible uses for the funds include the following: (1) reduce the septage management service costs of residents (i.e. cross subsidy); (2) set aside in a reserve fund to finance anticipated capital investments and service improvements; and (3) set aside in a reserve fund for broader environmental programs such as watershed management or reforestation. Importantly, the use of the funds must be clearly codified in a local policy resolution to ensure that the funds are used in accordance with their intention.

[22] Note that the policy of the NWRB is that regulated utilities under its authority are permitted to charge up to a 12% return on the rate base. Thus, this amount may serve as a reference point for charging nonresidents for septage management services.

5.3 RATE STRUCTURES: OPTIONS FOR MEASURING PROPORTIONALITY

The second key decision-point in the development of a septage pricing framework is the determination of the rate structure. After reviewing possible options and discussing with stakeholders, we see three fundamental options: (1) the percentage of the water bill, (2) a uniform rate per cubic meter of water consumed, and (3) a flat fee based upon the cost of service. Before considering the three approaches in greater detail, it is first necessary to highlight a critical distinction between the three approaches, namely, that the first two approaches are based upon the volume of water *consumed* while that last option is based upon the cost of the desludging *service* itself. While all three approaches can recover the same amount of revenue requirements, what is at stake in the selection of the approach is how these revenue requirements are distributed across customers. For the water consumption based pricing, for example, those who consume more water pay a greater share of the overall revenue requirements for the septage management program. It is important to note, however, that *this study did not find any conclusive evidence that the amount of water consumed by a household actually leads to a greater amount of pollution in the form of more septage generated*.

While there is a relatively strong link between water consumption and the volume of wastewater produced, the same cannot be said for septage, as there are many variables that affect how much septage is vacuumed from a septic tank, including the types of toilets used in the house, the types of materials disposed of from the kitchen, the size of the septic tank, and the extent to which the tank is actually functioning correctly. Regarding the last variable, a household can actually consume a lower volume of water than its neighbor but pollute the environment more given the fact that its septic tank does not function properly and, as a result, a greater amount of untreated wastewater is leaking directly into the environment. Further, the marginal cost to the utility of emptying two neighboring septic tanks is essentially the same, even if one customer uses 20% more water than the other.

On a related note, we elected not to consider the *volume of septage produced* as a viable approach for billing residential and business customers due to practical concerns. Depending on the equipment installed on the vacuum truck, for example, it may not be possible to accurately measure the volume pumped from a given tank, not to mention the fact that relying on volumetric measurements at the time of service opens the door for corruption. Also, since the volume is not known in advance, this approach would greatly complicate the use of installment payments, as customers would inevitably overpay or underpay over the course of a five years period, requiring final account reconciliation once the volume of septage is measured.

Percentage of Water Bill

Under the "percentage of the water bill" approach, the septage rate is simply set as a fraction of the overall water bill. Assuming a a water bill of PhP 250 and a 10% septage fee, the customer would pay PhP 25 that month for septage management for a combined bill of PhP 275. The septage bill will therefore fluctuate from one month to the next as it is directly tied to both the volume and price per cubic meter of water consumed. The following table highlights the advantages and disadvantages of this approach.

Table 10: Advantages and Disadvantages of the Percentage of Water Bill Pricing Approach	
Advantages:	▪ **Easily Implemented** – WD's only need to apply a fixed percentage to each customer's bill to arrive at the the septage cost each month. No further differentiation is required by customer types. Notably, in a survey of 11 water districts, six (55%) preferred this approach. ▪ **Affordability** – By building off the existing tariff structure, the percentage approach automatically incorporates the increasingly block rate tariff structures that most WDs utilize. Thus, this approach ensures that those who consume only the subsidized life-line tariff block will also benefit from a cross subsidy for septage. ▪ **Incentives to Conserve Water / Reduce Contribution to Pollution** – Following the "polluter pays" principle, those who use more water and thus produce more pollution pay a greater share of the costs. Again, however, we must qualify this statement by noting that there is limited evidence that greater water consumption actually leads to greater septage volume.
Disadvantages:	▪ **Not Based on Cost of Service (Inequitable)** – The customer does not necessarily pay an amount equal to the actual cost of service. In other words, customers that impose a similar burden on the utility may end up paying very different amounts. ▪ **"Hidden" Rate Increases** – A rate increase in water tariffs will automatically lead to a rate increase for septage services, even though there may be no associated benefit to the customer in terms of more/better septage services. ▪ **Not Transferable to Non-WD Customers** – By linking the septage directly to water consumption, WDs and LGUs will need to derive a separate, parallel pricing structure for non-WD customers living in the same jurisdiction. This could be especially consequential for WDs with lower service coverage.

As noted in the table, probably the biggest challenge with this approach is that the customer does not necessarily pay an amount equal to the actual cost of service—or the cost to desludge, transport, and treat the septage. In other words, even though the cost to service the average five cubic meter septic tank every five years is PhP 2,000 (or PhP 33/month), the actual fee charged may be very different from this amount. Indeed, as discussed in the illustrative case below, some customers could end up paying upwards of 50% to 75% more than the cost of service.

One possible strategy to mitigate the extent to which the tariff deviates from the cost of service—as well as to limit the extent to which "hidden" rate increases occur—is to impose a cap on the amount that a customer can pay each month is septage fees. In other words, continuing with the above example where the average cost of service is PhP 33 / month, a cap could be placed on any one bill of PhP 50 per month, thereby limiting the extent to which the septage charge can deviate from the average cost. This would also help to mitigate the impact of the "hidden" rate increases, in that significant hikes in water charges would automatically push most customers close to (if not at) the monthly cap. In order to adjust the cap, a request specific to septage would then have to undergo the normal due diligence and approval process.

Uniform Rate per Cubic Meter

Under the "uniform rate per cubic meter" approach (or the "uniform rate approach") the customer is charged based upon a uniform rate per cubic meter of water consumed. Assuming that the customer consumed 17 cubic meters in a month and the cubic meter rate is PhP 2 per cubic meter, the customer would be charged PhP 34 for that period. The following table highlights the advantages and disadvantages of this approach.

Table 11: Advantages and Disadvantages of the Uniform Rate per Cubic Meter

Advantages:	▪ **High Economic Efficiency / Direct Proportionality** – Of the three rate approaches, the uniform rate approach introduces the greatest level of economic efficiency in that the septage fee is still based on consumption (following the "polluter pays" principle) but all subsidies are eliminated, meaning that all customers pay the "full cost" from the first meter of water consumed. ▪ **Transparency** – In comparison to the percentage bill approach, the uniform rate per cubic meter is more transparent given that it would guard against "hidden" rate increases. Thus, the WD will need to explicitly justify a septage rate increase (going from PhP 2.0 to PhP 2.2, for example).
Disadvantages:	▪ **Not Based on Cost of Service (Inequitable)** – The customer does not necessarily pay an amount equal to the actual cost of service. In other words, customers that impose a similar burden on the utility may end up paying very different amounts. ▪ **Not Transferable to Non-WD Customers** – By linking the septage directly to water consumption, WDs and LGUs will need to derive a separate, parallel pricing structure for non-WD customers living in the same jurisdiction. This could be especially consequential for WDs with lower service coverage. ▪ **Complexity of Implementation** – The WD will need to derive separate unit rates for all different classes of customers and justify increases accordingly. ▪ **Affordability Concerns**. By charging uniform rates from the very first meter of consumption, customers that only avail of the lifeline block will no longer benefit from a subsidy.

As mentioned under the international case studies, uniform block pricing is the most common form of pricing for sewerage systems. Very few sewerage utilities utilize an increasing block structure, in other words. This is due in part to the fact that the idea behind increasing block rates is to incentivize conservation, a notion which is not wholly applicable to sewerage. Further, the use of increasing (or decreasing) block rates adds yet another layer of complexity for rate-payers to sort through as they attempt to understand their bills.

On a related note, one of the perceived challenges with the uniform rate structure (and, to a greater extent, the flat fee structure described below) is that it does not incorporate a cross-subsidy for the lifeline tariff block, making it effectively more regressive than an increasing-block structure. It is important to recognize, however, that lower income households do not necessarily consume lesser amounts of water on a monthly basis. While there are a number of reasons for this, one of the more notable is that a piped water connection to a poorer home frequently serves multiple families, there by pushing consumption well past the lifeline block even though water use *per capita* may be low (McIntosh, 2003).

Finally, the uniform rate per cubic meter was commonly used as the unit of analysis by PWRF-SP when performing financial feasibility studies for water districts interested in implementing a septage management program. As shown in Annex B, the average rate for a fully mechanized program was PhP 2.72 per cubic meter, while the resulting rates for hybrid and non-mechanized systems were PhP 2.27 per cubic meter and 1.74 per cubic meter, respectively. These rates were inclusive of collection and transportation costs in addition to the cost of constructing and operating the treatment plant.

Flat Fee

Finally, the "flat fee" approach simply utilizes the average cost for servicing a septic tank and charges it as a flat fee to each customer. Once again, assuming that the financial analysis results in a cost of service of PhP 2,000 for desludging every five years, this amount would then be divided by 60 months to arrive at a flat fee of PhP 33 per month. The following table highlights the advantages and disadvantages of this approach.

Table 12: Advantages and Disadvantages of the Flat Fee Approach

Advantages:	▪ **Based on Cost of Service (Equitable)** – The rate charge to the customer is directly based upon the average cost of service, and thus is fairly easily explained to the customer. Similarly, it is equitable in the sense that customers that place a similar burden on the utility are charged the same cost of service. ▪ **Transferable** – For WDs that have a lower water supply service coverage and desire to extend septage coverage beyond existing customers, the flat fee approach avoids the need for competing rate structures given that the septage fee is not tied to water consumption. ▪ **Easily Implemented** – Given that the fee is constant, it requires no recalculation or adjustment from one month to the next.
Disadvantages:	▪ **Lower Economic Efficiency / Incentives to Conserve**. Given that the rate is not tied to water consumption, there is no additional incentive to conserve water, and, in doing so, reduce the level of pollution produced. ▪ **Affordability Concerns (Regressive)**. By charging a flat rate, those customers consuming only the lifeline block will still pay the full cost of the service. In other words, there is no cross-subsidy.

In order to mitigate affordability concerns, it may be possible to develop cross-subsidies between residential customers based upon the physical characteristics of the home. Using existing data on the home—such as size of the property (square meters), number of bathrooms, or size of the septic tank—several different "levels" of flat fees could be developed. Using the average cost of PhP 33 as the starting point, for example, "small" homes could then be charged PhP 27, medium homes PhP 33 (the average), and large homes PhP 39. Such a system would, of course, require a one-time field verification of house size, but this could easily be rolled into the septage collection process. In other words, when visiting a home to empty the septic tank, the WD team can record the physical characteristic of the home to determine if it is entitled to a lower fee.

Illustrative Analysis – Camarines Norte

While all three approaches can recover the same amount of revenue requirements, what is at stake in the selection of the tariff approach is how these revenue requirements are distributed across the customer base. The percentage of water bill, uniform rate per cubic meter, and flat fee approaches call all, in other words, achieve full cost recovery for a water district's septage management program. As noted above, however, each approach brings with it different incentives for customers and different implementation challenges for the water district.

To illustrate this more clearly, let's consider the case of a proposed septage management program in the Municipality of Camarines Norte. More specifically, in 2011 PWRF-SP completed a feasibility study for the Municipality to construct a fully mechanized septage treatment plant to serve approximately 20,000 households. The overall capital expenditure for the program was estimated at PhP 74 million, inclusive of the land, the treatment facility (with a capacity of 45 cubic meters per day) and two vacuum trucks. Further, phase one (2013 – 2017) operating costs were estimated to be PhP 23.6 million, or PhP 4.72 million per year.

Utilizing the detailed financial analysis originally conducted for the study, we can calculate the resulting tariff for each of the approaches proposed above. Table 13 below summarizes the results of the analysis, specifically showing the impact for "minimum use" customers (those using only the lifeline block of 10 cubic meters) and "average customer (those consuming 17 cubic meters of water per month).

Table 13: Illustrative Tariff Structures for Camarines Norte Septage Management Program

Pricing Approach	Unit Cost	Minimum Use Customer		Average Customer	
		Monthly Average	Desludging Cost / 5 yrs	Monthly Average	Desludging Cost / 5 yrs
% of Water Bill	15.3%	P 22.0	P 1,320	P 41.0	P 2,460
% of Water Bill (w/ Cap)	20%	P30	P1,800	P 55.0	P3,288
Uniform Price / m3	P 3.16	P 31.6	P 1,896	P 53.7	P 3,223
Flat Fee / month	P 39	P 39.0	P 2,340	P 39.0	P 2,340

Additionally, the figures at the top of the following page show the associated cost curves for each rate approach, demonstrating how increased consumption (up to 40 cubic meters) translates into increased septage charges, both in nominal terms (Figure 8) and percentage terms (Figure 7).

While this analysis does not address issues such as ease of implementation, it nonetheless demonstrates several important points concerning the available pricing options:

- The cheapest option—from the perspective of the customer—changes based on water consumption. Specifically, for customers using only the lifeline tariff block of 10 cubic meters, the percentage of water bill methodology is the cheapest, resulting in an average monthly charge of PhP 22 and an overall desludging charge of PhP 1,320. However, for an average customer (consuming 17 cubic meters), the flat fee becomes the cheapest option at PhP 39 per month or P 2,340 for the overall desludging charge.

Figure 7: Septage Fee as a % of Total Bill

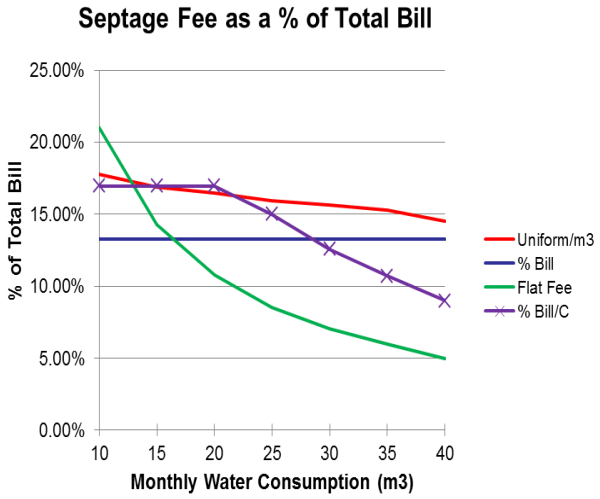
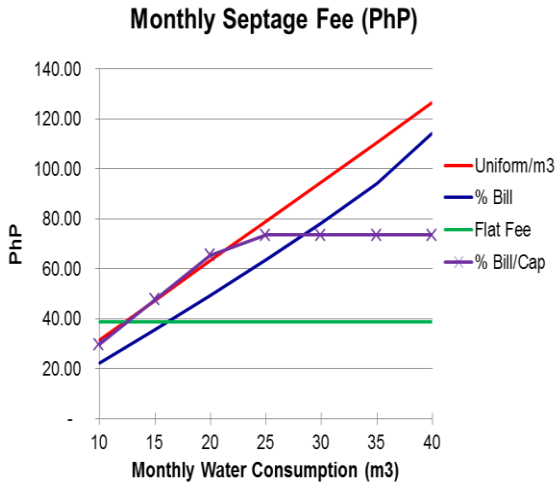


Figure 8: Monthly Septage Fee Cost Curve



- The capacity-based options results in significant variability for the desludging service. Under the percentage bill approach, for example, a residential customer consuming 25 cubic meters would effectively pay PhP 3,824 for desludging service every five years, or nearly three-fold what a minimum use customer pays for the same service and about 65% above the cost of service.
- The flat-fee approach is, of course, the most regressive when compared to volume of water consumed. For a minimum-use customer, the septage charge represents about 20% of the water bill, while it only represents 13.2% of the bill for the percentage bill methodology. Per the table below, however, all three approaches (and percentage of bill with cap) result in a combined water/septage bill that is well below 5% of the monthly income of the lowest income group in Camarines Norte.

Table 14: Tariff Affordability Comparison

	Uniform/ m3	% Bill	Flat Fee	% Bill/C
Current Tariff	146	146	146	146
Septage Charge	32	22	39	30
Total Tariff	178	168	185	176
5% of LIC Income	392	392	392	392
% of Affordable Tariff	**45%**	**43%**	**47%**	**45%**

Notably, the Camarines Norte Water District serves only about 50% of the population within the political jurisdiction. Thus, in order to extend the septage services beyond the WD customers and minimize the negative externalities associated with poor septage management, the WD will need to develop an alternative pricing mechanism were it to opt for a volume-based approach for existing customers. Arguably the most defensible approach for residents of the jurisdiction would be to use the average cost resulting from the financial analysis, or PhP 2,340. This would mean, however, that WD customers consuming more than 17 cubic meters per month would effectively be paying more than their non-WD neighbors.

5.4 BILLING ADMINISTRATION

The clear best practice for effective and cost-efficient septage management billing is to utilize regular billing that allows households and businesses to pay septage management costs in small, affordable installments over three to five years time. Not only does this practice ease household financial planning, but it also results in a more regular, predictable stream of income for the water district. In terms of specific billing mechanisms, the following options are worthy of consideration:

- *Water Bill*. Obviously the easiest and most practical means of billing for septage management services for WD-operated septage management plans is to include the fees within the water bill itself. Indeed, even for LGU-operated systems, it makes sense to "piggy-back" off of water billing as much as possible, as is evidenced by Alabel's consideration of integrating its septage billing with collections under its Level III Water System.
- *Property Tax*. For non-WD customers, it would likely make the most sense to include septage management fees as a separate line item on the property owner's annual property tax bill. This approach is in line with the Clean Water Act, which states that, "Each LGU may raise funds to subsidize necessary expenses for the operation and maintenance of sewerage and septage facility servicing their area of jurisdiction through local property taxes and enforcement of a service fee system." While the use of the property tax does not allow for monthly or quarterly billing, it nonetheless breaks down a potentially sizable lump-sum payment into five installments (assuming that sludge collection is performed every five years, that is.) A one-time fee of PhP 2,000, for example, becomes a more manageable yearly payment of PhP 400.
- *Business Operating Permits.* The use of business permits represents another viable option for non-WD, commercial customers. Given the common requirement for nearly all businesses to hold and annually renew a business permit, the septage management fee could be collected at the same time, with evidence of payment required prior to the issuance of the business payment.

Regardless of the mechanism ultimately utilized for the billing of septage management costs, two additional clarifications apply. First, the fee itself should be clearly stated on the bill as **a separate line item**, and not rolled into, for example, the overall water charges. Breaking out the septage fee increases the transparency of the cost that customers are paying, and helps to ensure that they are aware of their entitlement to regular septage desludging services. Embedding the cost would only engender confusion among rate-payers, who may (1) suddenly see their charges increase and not be aware of the rationale, or (2) move into the jurisdiction *after* septage charges have been integrated into the water bill and not even be aware that they are paying for the service.

Second, in the examples seen to date in the Philippines, the tendency has been to use the term "Environmental Fee" to describe septage management services. This term may encompass a number of services—including watershed management or restoration services—and thus reduces billing transparency. To address this, water districts and LGUs should utilize a more descriptive term, such as **Septage Management Fee** or **Sanitation Fee**. By using such less ambiguous terms, customers reviewing their bills will be able to immediately understand what services are covered by the line item and better hold their utility or LGU accountable for the provision of those services.

5.5 SUMMARY OF STUDY RESULTS

As LWUA seeks to provide guidance to the water districts that it regulates, the PWRF-SP recommends that the Administration consider the following conclusions resulting from this study:

Conclusion #1: To the maximum extent possible, the establishment and operation of a WD septage management program should be coordinated with the LGU and codified within the local policy framework. Given the significant negative externalities associated with sanitation, the full benefit of the septage management program will only be realized when the LGU as a whole implements improved septage management practices. The execution of an LGU ordinance that mandates regular household desludging and septic tank inspections is the logical first step to development of the local policy framework.

Conclusion #2: Septage management cost centers and revenue streams should always be ring-fenced from water supply accounts in order to ensure the accurate accounting of incoming and outgoing funds.

Conclusion #3: To determine the revenue requirements for a septage management program, water districts should continue to utilize the cash needs approach in order to remain consistent with current practices. However, in order to strengthen the "business case" for septage management, WDs may consider the following strategies:

- Budget for healthy operating and debt reserves, on the order of 8 to 10%;
- Include a sinking fund for vacuum trucks would help the utility prepare for the inevitable replacement of its fleet.
- Charge a premium to to clients availing of services from outside the political jurisdiction to compensate the WD and LGU for the associated risk of serving these clients.

Conclusion #4: All three pricing approaches can recover the same amount of revenue requirements. Thus, the selection of the tariff structure is, fundamentally, a *policy decision* tied to local service conditions and development objectives:

- If the LWUA and WDs prefer to base septage charges on the *cost of service* and facilitate septage services beyond WD customers, then PWRF-SP recommends the use of the flat fee approach, which most closely approximates the amount of costs that the WD will incur to service an individual septic tank and is easily transferred to non-WD customers. However, a subsidized rate is recommended for low-income household to mitigate the regressive nature of this approach.
- If the priority of LWUA and WDs is to provide greater incentives for customers to consume lower volumes of water as well as to incorporate cross subsidies into septage pricing, the PWRF-SP recommends the percentage bill approach. However, to protect customers from excessive charges over the long term due to unrelated water rate hikes, we recommend the inclusion of rate caps that require formal due diligence and public consultation prior to adjustment.

Conclusion #5: The easiest and most practical means of billing for septage management services for WD-operated septage management plans is to include the fee within the water bill itself as a *distinct, separate line item* that is clearly labeled as "sanitation fee" or "septage fee." Viable alternatives for non-WD customers include the property tax and as part of business permits (for commercial entities).

Perhaps the most important determination of success for WD septage management programs going forward will be the flexibility to make changes based on what works and what doesn't as more experience is gained on the ground. Obtaining feedback from the water districts and the customers themselves and changing course where necessary will be critical to engendering sustainable septic management practices, thereby protecting vulnerable groundwater resources and safeguarding public health.

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Annex A: Interviews Conducted

Institution	Name	Position	Date
Alabel Local Government	Rivera, Allan	Muncipal Environmental Officer	(multiple dates)
Baliwag Water District			14 May 2012
Cabanatuan City Water District	Villasan, Mario	General Manager	10 May 2012
Dumaguete Water District	Villanueva, Mark	Division Manager, Accounting, Budget & Finance Division	10 May 2012
Local Water Utility Administration	Oscar Jusi, Ricardo Quiras, Roncesvalles, Jose Rene C. Peralta, Rodney De Leon, Reynaldo Cachuela, Clint Pinto, Ronaldo Fidel, Amelita	Acting Department Manager Acting Division Manager Division Manager Principal Engineer Division Manager Division Manager Division Manager Financial Analyst	7 May 2012
MWSS-Regulatory Office	Rivera, Goldelio G. Atty.	Deputy Administrator for Financial Regulation	18 April 2012

Annex B: PWRF-SP Rate Study Results

Since 2008 the PWRF-SP has carried out a total of 17 rate studies for proposed water district septage management programs. The table below summarizes the results of the cost recovery tariffs that resulted from these studies, including the suggest rates for each of the three principal technology options. When conducting these studies, PWRF generally used the uniform rate per cubic meter of water consumed methodology in order to entirely isolate the incremental tariffs attributed to the septage project. In a few studies, the percentage of water bill was also employed to conduct the analysis. All rates below are inclusive of collection and transportation costs in addition to the cost of constructing and operating the treatment plant.

#	Location	FS Date	Fully Mechanized	Hybrid System	Non-Mechanized
Uniform Rate per Cubic Meter					
1	Bacolod	2011	1.65	1.47	1.05
2	Camarines Norte	2011	3.16	2.85	2.26
3	General Santos	2011	1.76	1.57	1.32
4	Hagonoy	2011	2.04	1.73	1.36
5	Isabela	2011	4.59	3.34	1.90
6	Kidapawan	2011	3.12	2.74	2.21
7	Laguna	2011	1.99	1.74	1.41
8	Mabalacat	2011	1.95	1.74	1.48
9	Cebu	2011	1.65	na	na
10	Iloilo	2011	2.60	2.17	1.51
11	Kalibo	2011	4.60	3.70	2.75
12	Roxas	2011	3.15	2.56	1.91
13	San Pablo	2010	na	1.20	na
14	Tagum	2011	3.10	2.64	1.71
	Average		**2.72**	**2.27**	**1.74**
Percentage of Water Bill					
15	Baliwag	2009	8.00%	na	na
16	Cabanatuan	2008	10.00%	na	na
17	San Jose Del Monte	2011	6.50%	5.80%	4.30%
	Average		**8.17%**	**5.80%**	**4.30%**