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## Setting User Charges for Urban Water Supply: A Case Study of the Metropolitan Cebu Water District in the Philippines

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**SETTING USER CHARGES  
FOR URBAN WATER SUPPLY:  
A CASE STUDY OF THE METROPOLITAN CEBU  
WATER DISTRICT IN THE PHILIPPINES**

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**JUNE 2006**

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## **FOREWORD**

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## **ABSTRACT**

The Asian Development Bank (ADB) has a sound position on user charges, a position that should guide ADB's policy discussions with borrowing governments. ADB's practice in reviewing tariffs covers only a few parts of ADB's position, though, limiting ADB's potential effectiveness in helping to improve policies. This paper gives an example of the kind of tariff review that could be the basis of policy discussions, and also of project design and analysis. We use the tariff of the Metropolitan Cebu Water District in the Philippines as an example, because the tariff meets and even goes beyond ADB's position, and is a good model for other water tariffs to follow.

The example should be useful to project teams at ADB doing sector studies and processing loans in urban water supply. The paper might also be useful to governments in ADB's developing member countries, and to partner foreign aid organizations, to help them understand ADB's position and good practice in urban water supply.

## I. INTRODUCTION

User charges or tariffs for urban water supply are important in the operations of the Asian Development Bank (ADB). From 1999 to 2005, ADB approved 43 loans that included urban water supply or wastewater management. Water tariffs directly influence the operation and the social value of water supply investments, and indirectly influence investments in wastewater management.

ADB has a clear and coherent position on setting tariffs for urban water supply, and for other public services. ADB believes a tariff should try to meet at least the following five goals:

- A. Good governance: be simple, transparent, and predictable.
- B. Financial sustainability: ensure the financial sustainability of the enterprise without subsidies, with a few exceptions.
- C. Distributive justice: help the poor satisfy their basic needs, when other ways are not available.
- D. Economic efficiency: promote efficient use of resources.
- E. Fair pricing: avoid cross-subsidies, especially those that affect economic efficiency.

Other goals might also be relevant, like using the tariff to extend service to people without connections. This paper focuses on the five goals above because they are the main ones in ADB's position, but that does not mean other goals are less relevant or important. (See Dole 2003 for a detailed discussion of ADB's position on tariffs; and Dole and Bartlett 2004 for more discussion of these five goals. ADB's position on tariffs is based on ADB's water policy [ADB 2001b] and other official documents.)

ADB's position on tariffs and ADB's water policy should be a guide to policy discussions with a government in developing a water project. ADB does not try to dictate tariffs, but should encourage a government to consider the five goals above in tariff setting (ADB 2001a, 47 and chapter 4). Better policy on tariffs can produce better projects, and can also improve the performance of the sector, including projects not supported by ADB. The five goals in ADB's position are almost always relevant in setting tariffs, but are not always easy to reach. ADB can help raise awareness or understanding of these goals, and help the government reach them eventually.

ADB's policy discussions, however, do not always fully or adequately present ADB's position. A review of the tariffs and policy discussion in ADB-supported projects found that ADB focuses on financial issues, with some attention to avoiding financial hardship for the poor. The analysis of helping the poor satisfy their basic needs could be much better, and the three other goals are almost always ignored (Dole 2003).

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This paper aims to help improve ADB’s practice by providing an example of how to review a tariff for urban water supply relative to ADB’s position. A tariff review can show how to improve policy and practice, and should provide the basis for ADB’s policy discussions. The review, presented in Section II below, focuses on the five goals listed above. There might also be other issues to consider in analyzing a tariff, and there are also other issues relevant to the performance of a utility, such as its financial management, quality control, and others. This paper focuses only on reviewing a water tariff relative to ADB’s position, and is not a full analysis of a tariff or a utility.

The paper uses the tariff of the Metropolitan Cebu Water District (MCWD; also “Cebu Water”) as an example of applying ADB’s position in reviewing a tariff. We chose this tariff because we believe it is sound, and could be a good model for other water tariffs (see Table 1). We use our analysis to suggest how the tariff could be improved, but we make these suggestions only in the context of presenting a model analysis, to guide future analyses conducted by ADB. Although ADB has previously supported projects for Cebu Water (ADB 1990 and ADB 1999b, the analysis in this paper was not done to support policy discussions with Cebu Water.

**TABLE 1**  
**TARIFF STRUCTURE OF METROPOLITAN CEBU WATER DISTRICT (AS OF 2004)**

USAGE CHARGES		FIXED CHARGES	
CONSUMPTION (m <sup>3</sup> per month)	CHARGE (pesos per m <sup>3</sup> )	METER SIZE (diameter in inches)	CHARGE (pesos per month)
< 10	0.00	.50	108.51
10 to < 20	11.97	.75	175.97
20 to < 30	14.07	1.00	344.60
≥30	38.61	1.50	879.83
		2.00	2,184.92
		3.00	3,929.92
		4.00	7,859.84
		6.00	11,782.42

The paper concludes in Section III with a brief discussion of the relevance of this paper to future tariff reviews, and the relevance of tariff reviews in general.

## II. A REVIEW OF THE WATER TARIFF OF METROPOLITAN CEBU WATER DISTRICT

The following reviews the policy for setting user charges for urban water supply in the Philippines, and how that policy is applied by Cebu Water. Cebu Water is a utility serving metropolitan Cebu, the second largest city in the Philippines. As of 2005, Cebu Water had about 106,350 connections and served 893,370 people, more than half the population of the service area, and about 56% of the 1.64 million population of Metro Cebu (MCWD 2005a). The rest



SECTION II  
A REVIEW OF THE WATER TARIFF OF METROPOLITAN CEBU WATER DISTRICT

of the population got their water from public or private wells, through private, local water systems, or by truck delivery. Cebu Water's customers are mostly domestic: 95% of connections are household, and about 60% of revenues are from sales to domestic connections (LWUA 1999). Table 2 summarizes Cebu Water's operations.

**TABLE 2**  
**CEBU WATER'S OPERATIONS**

	2004	2005	2006	2007	2008	2009
Connections (thousands)	99.15	106.35	120.75	135.15	149.55	163.95
People served (thousands)	836.50	893.37	1,014.33	1,135.29	1,256.25	1,377.21
Water produced (hundred thousand cubic meters)	54.32	54.65	60.76	65.45	74.42	80.60
Average operating and maintenance costs (P/m <sup>3</sup> )	11.65	13.59	16.22	16.81	23.92	26.07
Average total cost (P/m <sup>3</sup> )	15.14	16.98	19.28	19.67	26.46	28.45
Average charge (P/m <sup>3</sup> )	20.64	23.35	26.15	29.29	32.81	36.74
Nonrevenue water (%)	31.92	30.50	30.00	29.00	28.00	27.00
Total revenue (hundred thousand pesos)	784.00	857.00	1,136.00	1,390.00	1,795.00	2,207.00

Note: Actual for 2004, projections for later years.

This review is organized into six sections: one section for each of the five goals of ADB's position on setting tariffs, and one concluding section. Each section on the goals starts with a brief summary of the analysis and the main conclusions, followed by an analysis of tariff policy, and then an analysis of Cebu Water's tariff. The rest of this section describes the main sources of information used in the review.

Each section includes a brief description of ADB's position on the given goal. ADB's position is covered in a variety of official documents, and the description of ADB's position is based on a separate review and summary of those documents (Dole 2003).

The main source for the policy analysis is Presidential Decree No. 198, the "Provincial Water Utilities Act of 1973" (in the following we call it "the water utilities act", "the act", or PD 198). The water utilities act authorized creating quasi-public corporations to supply water and sanitation services, and established some of the goals of the associated tariffs. Cebu Water, like all water utilities outside Metropolitan Manila, is subject to the act.

The water utilities act also authorized creating the Local Water Utilities Administration (LWUA; also "Administration") to promote development and regulate water districts. The water utilities act authorized the Administration to review and approve water tariffs according to the act's provisions on tariffs. The Administration issued a *Manual on Water Rates and Related Aspects* ("the water rates manual", "the manual"; see Dumpit and Sambo 1994) to guide water districts in tariff setting. The water rates manual is based on PD 198, but it also covers some things on tariffs that are not in the act. The manual is a comprehensive statement of the Administration's position on tariffs, but only part of that position is formal policy established by law. The policy analysis below refers to the LWUA manual, analyzing topics that are not covered in PD 198.

In February 2005, Cebu Water issued a formal proposal to increase charges (the “rate proposal”; MCWD 2005c). The main reason for the higher charges is to pay for developing new water sources, including bulk water supply. The rate proposal is the main source of information for the analysis of financial sustainability, and for the analysis of good governance. As mentioned in the introduction, this study aims only to provide an example of reviewing a tariff relative to ADB’s position, and is not a critique of Cebu Water’s rate proposal. We make several suggestions for modifying the tariff, but our suggestions are relevant only for providing an example of a tariff review. Cebu Water’s proposal went through the formal process of review. The proposal was approved by Cebu Water on 28 February 2005, by LWUA on 23 August 2005, and took effect on 1 September 2005. This study was independent of the rate proposal, and did not try to influence or provide input to the proposal.

The other sources of information used in our analysis are a survey of households conducted for this study, and interviews with Cebu Water. Cebu Water provided general information to help us understand the system and the situation in Cebu, and answered our many questions.

## A. Good Governance

The governance policy of Cebu Water is consistent with ADB’s position, which requires a transparent process of setting tariffs or introducing changes, and that changes be introduced gradually. Cebu Water’s policy could be improved by simplifying customer classes, and explaining the basis for setting fixed charges.

Cebu Water applies policy effectively in its tariff setting. Customers understand and accept the basis of the current tariff and the proposed changes. Proposed changes will be gradually introduced over five years. Table 3 outlines the review and the recommendations of the detailed discussion of this section.

**TABLE 3**  
**OUTLINE FOR REVIEW OF GOOD GOVERNANCE**

	<b>SUMMARY</b>	<b>RECOMMENDATIONS</b>
<b>Policy</b>	Transparent process of tariff setting Predictable changes	Simplify customer classes Explain basis for fixed charges
<b>Practice</b>	Customers understand basis and charges Changes to be gradually introduced	Consider slower increase in charges

### 1. Policy Analysis

#### (a) ADB’s Position

ADB’s position is that tariffs should be simple, transparent, and predictable (Dole 2003), although ADB’s position does not clearly define what simple, transparent, and predictable mean for tariffs. The following is based on other interpretations of what they mean and how to achieve them (Dole and Bartlett 2004).

A tariff is simple if customers can easily understand their own charges, and if every component is needed to meet the tariff's goals. A tariff is transparent if customers understand and accept the basis for the tariff. A transparent tariff should be set through a clear and explicit process that involves the public both in collecting information and making decisions. A minimum standard for predictability is that changes are announced well before they take place, and that major changes are introduced gradually.

### **(b) Tariff policy for water districts**

The tariff policy for water districts does not specifically address simplicity. The water utilities act does not mention or recommend any type of tariff. The water rates manual explains the components of tariffs, including connection charges, fixed charges, usage charges, and customer classes.

The manual discusses setting each component, but does not describe how each is relevant to a tariff's goals. The manual recommends up to six customer classes, and prescribes "conversion factors" for each class relative to the "residential" class (Dumpit and Sambo 1994, 11). The manual does not explain the basis for the conversion factors, and they appear to be arbitrarily set, for convenience. Arbitrariness is not consistent with transparency, and the many customer classes could lead water districts to adopt complicated tariffs. Policy would be stronger if it recommended simpler tariffs with fewer customer classes, and explained the basis for setting the fixed charges per class.

Tariff policy otherwise supports transparency. The water utilities act requires water districts to hold public hearings to discuss proposed increases in tariffs (Office of the President 1978b, Section 5). The purpose of the hearings is "to inform [the public] about a proposed water-rate increase and ... serve as a venue for airing their opinions" (Dumpit and Sambo 1994, 53). A representative of the Administration attends the hearings, and does "an assessment of the public acceptable of the water-rate increase" (Dumpit and Sambo 1994, 56). The act also requires water districts to develop a public education program, to help the public understand (among other things) the water tariff and the basis for charges (Office of the President 1978c, Section 3). The manual has a chapter explaining how public hearings should be conducted (Dumpit and Sambo 1994, 53-6). The manual recommends that water districts learn about public opinions in developing proposed changes in tariffs, advertise the public hearings in affected areas, and decide whether the public accepts the proposed changes.

Tariff policy also supports predictability. The act limits increases in tariffs to 60% of the current rate. Under that constraint, increases beyond 60% would have to be introduced through repeated rounds of rate proposals and public hearings. The manual says that "rates must reflect a sense of historical continuity" and "should relate to a definite trend" (Dumpit and Sambo 1994, 2).

## **2. Tariff Setting in Cebu Water**

### **(a) Simplicity**

Cebu Water's tariff structure is simple. It has a fixed charge and a usage charge that does not vary across customers, despite the manual's recommendations. The fixed charge varies by meter size, but all customers face the same usage charge, which increases with increasing use. Table 1 (above) shows the tariff as of 2004 (not the proposed tariff for 2005). The rate proposal is for an annual 12% increase in all charges (except connection charges) for five years, and does not change the tariff structure.

The survey conducted for this study shows that almost all respondents understand the tariff and how they are charged. The survey asked respondents how much they would be charged if they did not use any water; 93% (75/80) answered correctly, showing that almost all respondents understood the fixed charge. The survey also asked how much more they would be charged if they used an extra cubic meter of water, relative to their current water bill; 95% (76/80) answered correctly, showing that they understood the usage charges.

### **(b) Transparency**

Cebu Water distributes pamphlets (in English and the local dialect, Cebuano) discussing the tariff schedule and how a bill is computed; the pamphlet could also explain the basis for the charges. As soon as Cebu Water had determined the need and size of the proposed rate increase, its officers met with the city government to get their support, and found out that a 12% annual increase would be acceptable. Cebu Water then discussed the increase with its own employees and other government agencies in August 2004, then with the press and businesses in September 2004. Following the tariff manual, Cebu Water launched a public information program before holding public hearings. Cebu Water has an active Public Affairs Department implementing its public education program in line with the water utilities act (Office of the President 1978c). The education program consists of radio and television appearances, newspaper articles, and visits to neighborhoods.

We interviewed journalists and nongovernment organizations, and found that there was enough time for the media to discuss the increase, and for the public to express their views. Some consumer groups protested the higher charges in front of Cebu Water's office, clearly showing that the public knew about the proposed changes. The groups protested for several reasons, including opposition to partly privatizing Cebu Water's operations, and Cebu Water's new building; protesters argued that money for the new building could have been used to finance new water sources and therefore avoid the need for higher charges.

Several hearings were held in 2005 in each affected municipality to discuss the proposed new charges. The main purpose of the public hearing is to raise public awareness. The district is supposed to consider any serious objections that come out of the hearings, and to try to reach a compromise, with the administration's help. Following the water rates manual, Cebu Water sent notices for each hearing to current and prospective customers, opinion leaders, and local officials, and posted notices in conspicuous public places 15 days before each hearing.

A representative of the Administration attended each hearing. No major issues were raised during the public hearings and the proposed increase in charges was accepted.

The survey conducted for this study found some conflicting information. The survey found that respondents understood and accepted the basis for water charges. The survey asked respondents about several different bases for charges, including paying for operating costs, debt, improvements, conservation, or subsidy to other users. Almost all respondents agreed that each was an acceptable basis for charges (at least 78/80 agreed to each basis, and some were unanimous). Most respondents (75%) were aware that Cebu Water was proposing a rate increase, but most (80%) opposed it. If customers understood and accepted the basis for charges, and higher charges had the same basis, then customers should accept the higher charges, at least in principle. The opposition to the rate increase in the survey could mean simply mean that people do not like the charges, even if they understand and accept the reasons. In any case, people opposed to the charges did not try or were not able to argue convincingly against higher charges in the public hearings.

### **(c) Predictability**

Because of Cebu Water's public information campaign, the public knew about the tariff increase even before the public hearing. As mentioned above, the survey conducted for this study found that most respondents knew about the higher charges. The survey was conducted in January 2005, before the public hearings in February and May.

The rate proposal plans for a 12% increase every year for five years, making it easy for customers to predict charges well into the future. Implementing the changes over five years has the further advantage of avoiding political interference with the charges. The increases could be introduced more slowly, by having smaller increases first and larger ones later, or by raising the charges by a small amount every month. We do not know whether the public would prefer slower changes, but Cebu Water could have proposed those options. The public also could have raised those options at the public hearings; it appears that no one raised it, and if so the public apparently accepts the proposed 12% annual increase.

## **B. Financial Sustainability**

Policy on financial sustainability is consistent with ADB's position, which requires that water utilities be financially independent and sustainable, be supported by tariff revenues, and that financial obligations be forecast based on cash needs. Policy could be improved by recommending that utilities (large ones especially) prepare asset management plans.

Cebu Water applies policy effectively in its tariff setting. Cebu Water's financial projections are robust, and under the projections the utility should remain financially sound and independent. The revenue projections in Table 6 (see the main text of this section) show Cebu Water's revenues growing by over 250% from 2005 to 2009, with the growth driven by higher charges and more connections. Assumptions underlying the projections are clearly identified, and most of them seem reasonable. For example, collection efficiency is assumed to be 95%, a rate that Cebu Water has met in recent years.

Two questionable assumptions are the water use per connection and projected depreciation. Water use per connection is assumed to be constant, despite significantly higher usage charges. Projections could be improved by investigating the effect of increasing charges on water use per connection, especially for connections using more than 30 cubic meters (m<sup>3</sup>) per month. Depreciation is assumed to rise at a rate that is inconsistent with the projected capital expenditures. Projected capital expenditures and associated depreciation could be more reliable if based on an asset management plan. Table 4 outlines the reviews and recommendations of the detailed discussing of this section.

**TABLE 4**  
**REVIEW OF FINANCIAL SUSTAINABILITY**

	<b>SUMMARY</b>	<b>RECOMMENDATIONS</b>
<b>Policy</b>	Tariffs provide for financial sustainability without subsidies Projected costs based on cash needs	Asset management plan for large utilities
<b>Practice</b>	Net income and cash flow positive over five years High rate of collection efficiency	Develop asset management plan Investigate effect of higher charges on use Revise forecasted depreciation

## **1. Policy Analysis**

### **(a) ADB's position**

A utility should have adequate funds to meet its future financial obligations. The funds should be enough to maintain the targeted level of service, and the funding must be secure, regardless of the source. ADB discourages external subsidies unless they are explicit, targeted, transparent, and justified (Dole 2003).

### **(b) Policy for water districts**

The water utilities act says that water districts "shall strive to attain financial independence, thereby minimizing Government subsidy" (Office of the President 1978a). Water districts "attain financial independence" by selling water, with rates set to cover operations and maintenance; debt service; replacing, extending, or improving facilities; and a "fund for reasonable reserves" (PD 198, Section 37). New customers reimburse the district for the cost of connecting to the system, including the cost of meters.

The water rates manual says that water districts should forecast their financial obligations using the cash-needs approach. Following this approach, a district's revenues should cover all cash needs, including operations and maintenance, debt service, and capital costs (Dumpit and Sambo 1994, 13). Projections of operations and maintenance costs should be

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<sup>1</sup> The issue is unresolved as this publication goes to press.

based on accounting records, adjusted according to expected changes. The manual also allows cash needs to include "equity and reserve ... where applicable" (Dumpit and Sambo 1994, 13), and mentions that reserves are "usually 3% to 10% of total receipts" (Dumpit and Sambo 1994, 43).

Reserves are supposed to further ensure financial sustainability by providing funds for contingencies or "fortuitous events." Use of cash reserves is subject to approval by the Administration (LWUA 2000, 1). In practice, the Administration loosely interprets "fortuitous events", and water districts are allowed to use reserves when they can not pay debt service, or when they need funds for operations and maintenance. Reserves may also be used to expand and improve facilities.

The water utilities act exempts water districts from paying income taxes and other national and local taxes (PD 198, Section 47). The Bureau of Internal Revenue, however, says that the tax exemption ended in 1996, based on Section 3 of Republic Act 7109 (BIR 2005, 5). Water districts disagree with the Bureau of Internal Revenue, and have taken the issue to the courts.<sup>1</sup> As a result, there are different opinions on whether income tax and value-added taxes should be included among the financial obligations of water districts.

Water districts have to pay a share of their revenues to the local government where they extract water (Malacañang Palace 1991). Despite the objections to income and other taxes, "revenue sharing" is accepted and is included among the financial obligations of water districts. ADB does not have an official position on revenue sharing.

## **2. Tariff Setting in Cebu Water**

### **(a) Projected financial statements**

Table 5 summarizes Cebu Water's projected financial statements from 2005 to 2009. The projections are based on the financial statements in Cebu Water's most recent annual report (MCWD 2004a) combined with the higher tariffs and other assumptions about the future, discussed further below. As a government owned and controlled corporation, Cebu Water's accounts are audited annually by the independent Commission on Audit.

Cebu Water follows the water rates manual in preparing financial statements and making projections. Cebu Water's *Databook* states that revenue "should be enough to cover operating and maintenance costs, administrative costs, revenue share, capital outlay, debt service, fund reserve as stated in the loan covenants and maintain a yearly cash balance equivalent to 1.5 months of the expected operating capital of the following year" (MCWD 2004a, 10). The projections do not include a return to capital, subsidies, income taxes, or value-added tax on water sales. The projections do include other (undisputed) payments to government, including "revenue sharing" with the city government and value-added tax on Cebu Water's other income (not water sales). Cebu Water does not get subsidies.

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**TABLE 5  
CEBU WATER'S FINANCIAL STATEMENTS (MILLIONS OF PESOS)**

	ACTUAL	PROJECTED				
	2004	2005	2006	2007	2008	2009
<b>Balance sheets</b>						
Fixed assets						
Plant	1725	1790	2149	2591	2807	2903
Land	296	296	296	296	296	296
Total	2021	2087	2445	2887	3103	3199
Current assets						
Cash	144	10	40	91	52	270
Accounts receivable	110	86	127	182	260	357
Other	208	256	292	335	390	458
Total	462	352	458	608	703	1086
Total assets	2483	2438	2903	3495	3806	4285
Capital 738	821	984	1271	1428	1734	
Long-term debt	1326	1223	1494	1723	1773	1807
Current liabilities	419	395	425	501	604	745
Total liabilities and capital	2483	2438	2903	3495	3806	4285
<b>Income statements</b>						
Operating revenues	784	857	1136	1390	1795	2207
Operating costs						
Operations and maintenance	431	509	690	781	1282	1534
Depreciation	129	127	130	133	136	140
Total	560	636	820	914	1418	1674
Net operating income	224	221	316	476	377	534
Other net income/expenses	16	8	-11	-14	-18	-22
Interest payments	-164	-163	-141	-174	-202	-206
Net income	76	67	163	288	157	305
<b>Cash flow statements</b>						
Operating cash flows						
Receipts	810	919	1160	1413	1816	2231
Payments	-472	-664	-773	-841	-1351	-1604
Net	338	255	388	572	465	627
Investing cash flows	-123	-194	-489	-575	-353	-236
Financing cash flows						
Loans	0	0	299	276	119	119
Payments	-199	-195	-169	-222	-271	-292
Net	-199	-195	130	54	-151	-173
Net cash flows	16	-133	29	51	-39	218
Beginning balance	24	144	10	40	91	52
Cash at end of year	40	10	40	91	52	270

Sources: MCWD (2005a and 2005c).



**(b) Short-run sustainability**

Cebu Water remains financially sound and independent under the 5-year projections. Net operating income varies between 21 and 34% of revenue, and net income varies similarly between 8 and 21% of revenue. Current liabilities grow by 90% between 2005 and 2009, in line with trends in expenditures, while long-term debt grows by almost 50%. Despite the higher debt, the debt ratio (short- and long-term debt divided by total assets) falls from 0.66 to 0.60, and Cebu Water's ability to service debt improves. The current ratio (current assets to current liabilities) improves from 0.89 to 1.46, and the interest cover (net operating income to interest payments) rises from 1.36 to 2.49.

Cebu Water's cash balances vary from 2005 to 2008, and then grow significantly in 2009. In 2009, cash increases more than five times to P270 million, from P52 million in 2008. The increase in cash comes from both an increase in operating cash flows and a decrease in outlays for investments. Projected cash flows beyond 2009 show cash balances remaining high, but falling to P194 million in 2012 (see the rate proposal on MCWD 2005c).

Water sales are the main source of Cebu Water's cash flows throughout the projections. Projected receipts increase by more than 240% from 2005 to 2009. Operating cash flows are positive for all five years, varying between 28 and 40% of receipts. The projected receipts are based on assumptions about the new charges, collection efficiency, number of connections, average use per connection, and "systems recovery rate" (1% of nonrevenue water). Both user charges and fixed charges are projected to increase by 12% each year, as in the rate proposal. The number of connections is projected to increase by 7,200 in 2005, and by 14,400 every year from 2006 to 2009. Water use per connection is assumed to be constant at 0.996 m<sup>3</sup> per connection per day, and the systems recovery rate is assumed to increase from 69.5% in 2005 to 73% in 2009.

Collection efficiency is assumed to be 95% of accounts. This is consistent with recent collection rates, which were 93 to 95% from 2001 to 2004 (MCWD 2005a). Following Cebu Water's standard practice, the projections include an allowance for bad debts at a constant rate of 2% of accounts receivable.

The high collection rate per account is due to a strict enforcement program. Cebu Water issues bills about one month before the due date, and gives a 5% discount to customers who pay on time. Three days after the due date, a 2% penalty is imposed, and customers are warned that a disconnection is pending. The customer is disconnected if payment is not received within 13 working days. After one month, the meter and the customer's pipe to the water main is removed. To restore service the customer has to pay the full cost of connecting, making it very expensive for customers who do not pay their bills within a month.

The projected water sales do not include any change in water use from higher charges. The higher charges are unlikely to affect the rate of new connections, since connection charges will not change, and even with the higher charges, Cebu Water provides the cheapest water source (see Section IIE for the cost of alternative water sources). The higher charges could, however, affect water use per connection. A 12% annual increase in the tariff over 5 years gives a 75% nominal increase in usage charges. With a 5% annual inflation rate (as assumed in the projections), the real increase in charges over 5 years is 38%.

Cebu Water believes that the higher tariffs will not affect usage, but more information is needed to reliably conclude that. Cebu Water could easily improve projections for 2006 and beyond by observing the effect that the higher usage charges have on use per connection in 2005, and by monitoring use per connection every year as the annual increases take place. Focusing on the connections using the most water could simplify the task of projecting changes in use per connection, by reducing the number and variety of connections to study. Table 6 shows total water consumption by meter size. Almost half of all water is consumed by half-inch connections using more than 30 m<sup>3</sup> per month.

**TABLE 6**  
**MONTHLY CONSUMPTION BY METER SIZE, 2004**

METER SIZE (INCHES)	NUMBER OF CONNECTIONS	CONSUMPTION (THOUSAND CUBIC METERS)				TOTAL
		0-10	10-20	20-30	>30	
0.50	98,602	85.5	418.9	583.7	1,482.3	2,570.4
0.75	70	0.0	0.2	0.1	13.2	13.6
1.00	223	0.1	0.2	0.2	266.2	266.6
1.50	57	0.0	0.0	0.0	46.1	46.2
2.00	142	0.0	0.0	0.0	129.1	129.2
3.00	23	0.0	0.0		51.2	51.2
4.00	24	0.0	0.0		90.0	90.0
6.00	12				128.1	128.1
Total	99,153	85.6	419.4	584.1	2,206.2	3,295.3

Source: MCWD (2005b).

The half-inch connections are clearly Cebu Water's most important customers. Table 7 shows our estimates of the percent of connections by level of water use, focusing on half-inch connections (the estimates are derived from Table 7; we do not know the true numbers, but our estimates are close). The table shows that probably half of all connections are half-inch connections consuming more than 30 m<sup>3</sup> per month. The table also shows that half-inch connections consuming more than 30 m<sup>3</sup> per month generate more than half of Cebu Water's revenues. Cebu Water believes that connections using more than 30 m<sup>3</sup> per month are usually two or more families sharing a connection. Connections using 20 to 30 m<sup>3</sup> per month are probably about 20% of all connections, providing about 20% of all revenues. Another 20% of connections are consuming 10 to 20 m<sup>3</sup>, providing about 15% of revenues. Probably less than 10% of connections consume less than 10 m<sup>3</sup> per month, generating just a few percent of Cebu Water's total revenues.

**TABLE 7**  
**HALF-INCH CONNECTIONS AND REVENUE GENERATED, BY LEVEL OF CONSUMPTION (PERCENT)**

	0-10	10-20	20-30	>30	Total
Percent of connections	9	20	20	50	98
Percent of revenue	3	15	20	57	95

Source: Estimated from Table 9.

### (c) Long-run sustainability

Longer-term projections are needed to fully assess long-run sustainability. The 5-year projections, however, give some indication that Cebu Water will likely be sustainable over the long run. Long-run sustainability is the natural result of a strategy of short-run sustainability.

Cebu Water plans to make significant investments in new plants over the next five years. The investments are mainly in developing new raw water sources, and improving the systems recovery rate. The projected balance sheets include the planned investments, with the value of fixed assets in plant growing by 62% from 2005 to 2009. The projected cash flow statements show cash outlays for investments exceeding operating cash flows slightly in 2007, and by about P100 million in 2006; in the three other years, outlays for investments are less than operating cash flows.

Actual depreciation charges in 2004 were calculated based on the book value of assets using the straight-line method; projected depreciation charges should vary broadly in line with book values. Nevertheless, the projected income statements show depreciation growing at a constant rate of just 2.5% over the 5-year period, while the book value of plant grows significantly (62%). The forecasted depreciation should be revised so that it is consistent with projected capital expenditures.

Although all of Cebu Water's planned capital expenditures are included in the projected cash outlays for investments, the projections could be more robust if they were based on an asset management plan. Asset management plans provide a framework for managing capital, and strike a balance between the conflicting demands of customers, shareholders, and regulators (IDP 2003 discusses asset management plans for water utilities). Such a plan would show all expansions and improvements and reduce reliance on reserves and contingency provisions. The plan would also help ensure that timely rehabilitation and replacement occurs to maximize the lifespan of existing capital.

### (d) Risks

The main uncertainty in the projections is Cebu Water's tax liability. As discussed in the policy section, the Bureau of Internal Revenue claims that water districts must pay taxes, but Cebu Water and many other water districts insist they are still exempt. Water districts have brought the issue to the courts with support from the Office of the Government Corporate Counsel. There is also a pending Executive Order requiring water districts to contribute to the "Patubig sa Barangay" (water for the village) Fund to provide funds for water supply to poor neighborhoods. Cebu Water is making arrangements to contribute to this fund instead of paying income or value-added taxes. Future contributions to the "Patubig sa Barangay" Fund will be covered by automatic adjustments to the tariff.

## C. Distributive Justice

Policy on distributive justice is consistent with ADB's position. Policy specifies that the tariff should provide 10 m<sup>3</sup> per month at no usage charge, and that the fixed charge should

be less than 5% of income for poor households. ADB's position does not specify the basic need or minimum charge, and it might not be relevant for policy to dictate those. Instead, policy could provide guidelines for establishing the basic need and minimum charge, which in turn should be set according to circumstances. Circumstances could be similar across the Philippines though, so setting the basic need and minimum charge in policy might be appropriate.

Poor households without connections can get help in satisfying their basic needs for water, but the tariff is probably the best option for helping households with connections. Cebu Water applies policy by offering 10 m<sup>3</sup> per month at no usage charge, and with fixed charges at less than 5% of income. The tariff could help the poor more effectively if the lifeline block was reduced, for example to 6 m<sup>3</sup> per month, and if the fixed charge was waived when consumption was in the lifeline block. The poor could also be helped further by subsidizing connection charges, or making it easier to pay connection charges. Table 8 outlines the review and the recommendations of this section, followed by a detailed discussion of tariff policy and practice on distributive justice.

**TABLE 8**  
**REVIEW OF DISTRIBUTIVE JUSTICE**

SUMMARY		RECOMMENDATIONS
<b>Policy</b>	10 m <sup>3</sup> /month charged at < 5% income	Set guidelines for basic needs and minimum consumption
<b>Practice</b>	Free or low cost water from public faucets 10 m <sup>3</sup> /month charged at < P150 per month	Set lifeline block at 6 m <sup>3</sup> /month Waive fixed charges for basic needs Subsidize connection costs

## 1. Policy Analysis

### (a) ADB's position

ADB strongly supports helping the poor satisfy their basic needs, including the need for clean water. There are many ways to help the poor satisfy their basic needs, including direct income subsidies or reimbursing the poor for their water bills (Foster, Gomez-Lobo, and Halpern 2000). ADB supports using the tariff to help the poor when it is clear the tariff is the best or only feasible way (Dole 2003).

When the tariff is used to help the poor, ADB encourages using "lifeline tariffs." A lifeline tariff has a low usage charge up to the basic need for water, with the usage charge above the basic need set on other grounds. The usage charges above basic needs are higher, so the lifeline tariff is a kind of increasing block tariff. The usage charge in the lifeline block can be set so that the cost of the basic need of a poor household is less than a given percentage of income, but ADB does not have a specific position on that. ADB's position also requires that the target group for subsidies should be clearly identified, but a lifeline tariff allows the people consuming only their basic needs to identify themselves, through their metered consumption.

### (b) Policy for water districts

The water utilities act does not discuss using tariffs to help the poor, but the water rates manual does. The manual says that rates should be set so that some minimum level of consumption would be billed at a low fixed cost to help customers with low incomes (Dumpit and Sambo 1994, 1). The manual defines the minimum consumption as 10 m<sup>3</sup> per month, and the minimum charge as 5% of the average income in the "low-income group in the service area" (Dumpit and Sambo 1994, 1).

The minimum consumption does not need to be set in policy. It is usually better for policy to set guidelines for minimum consumption, and let minimum consumption be set according to local conditions. If conditions do not vary much across the Philippines, though, conditions can be set in policy, saving water districts the cost and effort of setting their own levels. Even if it is relevant to set the minimum consumption in policy, 10 m<sup>3</sup> is probably too high, and minimum consumption could be lowered to 6 m<sup>3</sup> per month (McIntosh 2003, 83).

The manual claims "it has been ascertained that a water consumption of 10 m<sup>3</sup> per month will provide for the basic service requirements", but does not otherwise explain the basis for setting the minimum (Dumpit and Sambo 1994, 1). The minimum level of 10 m<sup>3</sup> per month was established in the early days of the Administration, based on recommendations by consultants. The Administration has used 10 m<sup>3</sup> per month as the standard since then, and no one in the Administration currently knows the basis for the standard. The manual defines the "low-income group" as "that sector of residential customers having the lowest capability to pay for water service" (Dumpit and Sambo 1994, 1). That definition is a bit vague, though, and in practice the Administration defines the "low income group" as households with average income in the second to the fifth decile of the income distribution for each province (LWUA 2004b, 2).

The water rates manual also says that when the fixed charge is more than 5% of income, the fixed charge could be cut in half for customers using less than 5 m<sup>3</sup> per month. The manual says that customers could be offered a 3/8-inch connection instead of a half-inch connection, and a lower fixed charge corresponding to the smaller connection. The smaller connection lowers the maximum flow of water, but might not limit total water use in a billing period. The manual says that the fixed charges for 3/8-inch connections should be 40% of the fixed charge for half-inch connections (Dumpit and Sambo 1994, 10).

The tariff policy for water districts goes beyond helping the poor, and prescribes "socialized pricing" for water. The water utilities act requires the Administration to "implement a socialized pricing scheme ... whereby the more affluent, heavy users pay more per unit than the low-income, minimal users of water" (Office of the President 1978b, Section 1a). The water rates manual does not clearly explain how to carry out the socialized pricing scheme, despite the water utilities act telling the administration to do so. The manual appears to apply socialized pricing through fixed charges that vary by customer class, but the manual does not explain how or why the charges per customer class ensure that "affluent, heavy users pay more per unit."

The water utilities act says that charges should "provide for reimbursement from all new customers for the cost of installation of new services and meters" (PD 198, Section 37).

The water rates manual says that connection charges must “recover the cost of connecting the customer’s service line” (Dumpit and Sambo 1994, 61), even though the act does not make the specific connection between connection costs and connection charges. Requiring connection charges to equal connection costs has no obvious justification, and can make it hard for poor households to connect (see Section IIE for more discussion of connection costs and connection charges).

Tariff policy does not mention helping people without connections to get connected to the system. Requiring people to pay their connection cost rules out cross-subsidies for connection costs. Tariff policy therefore has an implicit (probably unintentional) bias against helping the unconnected to get connected.

## **2. Tariff Setting in Cebu Water**

### **(a) Nontariff options to help the poor**

The government tries to help the poor in various ways, including minimum wage laws, rent control, and comprehensive agrarian reform act, among others. Specific programs for the poor include “rolling stores”: trucks carrying basic commodities to poor neighborhoods to sell at low prices. Another program is discounted gasoline for public utility vehicles.

Options to help the poor get clean water include providing free water. The survey conducted for this study found that some people in areas not served by Cebu Water did get free water: in one neighborhood, 40% of people interviewed (8/20) got free water, and in another, everyone interviewed (12/12) got free water. The free water came from shallow wells built with funds from the local or national government. No treatment is provided for the free water, so it is probably not a good substitute for Cebu Water. Free water is not costless since it costs something to produce, and people who get the water face hauling costs. Hauling is a cost to consumers, though not necessarily a monetary cost.

The poor also have access to water from “small-scale water providers”, including cooperatives, *barangay* (village) water associations, and private parties who build and operate independent water supply systems. A study conducted on small-scale water providers in Manila showed that 38% of the base of local entrepreneurs and 32% of the customer base of cooperatives are at or below the poverty line (AusAID 2004, 2 and 3). At least in Manila, small-scale water providers help the poor satisfy their basic needs for water. Two small-scale water providers in Metro Cebu were covered in a study prepared for the National Water Resources Board, the regulator of these water providers. The study reported that most of the consumers of the these two water providers had low incomes (IDP 2005, 7).

### **(b) Cebu Water’s efforts to help the poor**

Cebu Water has several programs to help the poor satisfy their basic needs for water. It allows customers to pay the connection charges of about P5,000 with a down payment of P1,500, and with the balance paid in monthly installments over one year (MCWD 2004b, 14). For poor neighborhoods, Cebu Water organizes “community water associations” to provide

water through communal faucets. Table 9 shows the water rates for community water associations. Comparing the tariff for community water associations to the tariff for other connections (Table 1) shows that the charges for the associations are much lower than those for other connections.

**TABLE 9**  
**TARIFF FOR COMMUNITY WATER ASSOCIATIONS, 2004**

USAGE CHARGES		FIXED CHARGES	
CONSUMPTION (cubic meters per month)	CHARGE (pesos per cubic meter)	METER SIZE (diameter in inches)	CHARGE (pesos per month)
<10	0.00	.50	68.30
11-20	7.45	.75	109.29
21-30	8.80	1.00	218.55
31-40	10.24	1.50	546.38
41-172	12.07	2.00	1,365.94
>173	38.62	3.00	2,458.69
		4.00	4,917.38
		6.00	4,917.38

The charges of community water associations cover the costs of water provided by Cebu Water, and the association's costs in collecting charges per pail or container. Cebu Water recommends a charge of P54 per cubic meter, but does not otherwise regulate the charges to customers. An association uses excess funds to finance community projects like streetlights, pavement, and improvements to the water supply. The surveys conducted for this study found an average price per cubic meter of P92. The average monthly consumption for half-inch connections is 26 m<sup>3</sup>, with an average charge of P12 per cubic meter (see Figure 1 in Section IIE). Hence, on average, customers of the water associations are paying much more for water than people with connections to Cebu Water. The average charge in the water associations is also above the average charge from Cebu Water.

### (c) Setting the tariff to help the poor

The programs discussed above can help the poor in general, and can help the poor who do not have connections to Cebu Water. We could not find, however, anything that helps the poor with connections to satisfy their basic needs for water. The poor with connections may not be able to get the benefits of their connections, and unless other programs are available, the only way to help the poor is through the tariff.

The basic need for water in Cebu is about four to 8 m<sup>3</sup> per household per month. In the survey conducted for this study, poor households without connections reported using from 1.06 to 8.71 m<sup>3</sup> per month for drinking, cooking, and sanitation. The average consumption of respondents was 3.5 m<sup>3</sup> of water per month, at a cost of P421 per month, or P180 per cubic meter. The average monthly income of such households is P4,800 (LWUA 2004b, Table 1), so households without connections are spending 8.9% of their income on water for basic needs.

The survey asked households with connections how much water should be subsidized for a poor household; responses ranged from 4 to 6 m<sup>3</sup> per month, with an average of 5.2 m<sup>3</sup> per month. The Kauswagan Water and Sanitation Service Cooperative, a small-scale water provider serving part of the unserved areas in Metro Cebu, sets the minimum charge at 7 m<sup>3</sup> per month (IDP 2005, 7). Dolores Water District in Quezon Province uses 5 m<sup>3</sup> as the basis for their minimum charge (LWUA 2004c).

Cebu Water's lifeline block of 10 m<sup>3</sup> per month seems more than enough to help the poor satisfy their basic needs. There is no usage charge up to 10 m<sup>3</sup>, but customers do pay the connection cost and monthly fixed charge (see Section IIE for more discussion of connection costs). Connection costs are about P5,000 per connection, which is equivalent to a fixed charge of about P40 per month (P40 per month indefinitely has a present value of P5,000 at a 10% discount rate). The cost of funds to Cebu Water is probably much lower than the cost of funds for poor households (if the poor can get credit at all), so Cebu Water could help the poor a lot by financing connection costs. The cost for up to 10 m<sup>3</sup> per month is therefore less than P150 per month, which is about 3% of a monthly income of P4,800.

The current tariff seems to effectively help the poor satisfy their basic needs, but could go further. For example, the fixed charge could be waived entirely for customers consuming less than 10 m<sup>3</sup> per month. To reduce the cross-subsidies involved in such a change, the lifeline block could be reduced to 6 m<sup>3</sup> per month. Waiving the fixed charge would help customers with connections, but could hurt Cebu Water's incentive to serve and maintain those connections, and to add new connections in poor neighborhoods.

The connection charges are perhaps the biggest obstacle to the poor satisfying their basic needs for water. As mentioned above, Cebu Water lets customers pay the connection charge with a down payment and monthly installments, but even that could make it hard for poor customers to connect. To make it easier to pay, Cebu Water could lower the down payment, make the installments over a longer period, or even incorporate the connection charges into the regular tariff (through the fixed charges or usage charges). Incorporating connection charges into the tariff might not be consistent with policy, however, since the water rates manual says that connection charges should equal connection costs. Another option is for the government (not necessarily Cebu Water) to develop a program to pay connection costs for poor customers, but setting up such a program might be harder than changing the tariff.

#### **D. Economic Efficiency**

Policy on efficiency is vague, but nonetheless is stronger than ADB's position. ADB supports efficiency in tariff setting, but does not have a clear position on how to do it. Policy requires metering, a necessary condition for efficient charges. Policy supports setting the tariff for conservation and managing capacity, but is unclear on what those mean.

The marginal usage charge for most water use in Cebu is probably above long-run and short-run marginal production costs. The tariff might give proper incentives for efficient water use, but more information is needed on the long-run marginal cost, the economic value of raw water, and the economic cost of wastewater disposal. Higher marginal usage charges could reduce demand and improve service. The rate proposal will raise usage charges significantly. Cebu Water should monitor the effects of higher charges on consumption to



determine the potential for using prices to manage demand. Table 10 outlines the detailed review and the recommendations of this section.

**TABLE 10**  
**REVIEW OF ECONOMIC EFFICIENCY**

<b>SUMMARY</b>		<b>RECOMMENDATIONS</b>
<b>Policy</b>	Does not mention technical efficiency, and is vague about allocative efficiency All connections are metered	Endorse economic efficiency and pricing to manage demand Explain how to set charges for efficiency, conservation, and managing demand
<b>Practice</b>	Marginal charges are probably above long-run and short-run marginal cost	Measure economic value of raw water and cost of wastewater disposal Monitor effects of higher charges on use

## 1. Policy Analysis

### (a) ADB's position

ADB supports both kinds of efficiency relevant to tariff setting, technical efficiency, and allocative efficiency. Technical efficiency requires production at least economic cost. Allocative efficiency requires resources to be distributed for maximum benefit to society (which also requires technical efficiency). Standard economic theory says that tariffs can promote allocative efficiency when marginal usage charges are equal to the marginal social cost of water. Some economists think that means marginal usage charges should equal "short-run marginal cost" (Vickrey 1987), while others argue for "long-run marginal cost" (Bahl and Linn 1992). ADB does not have a clear position on short-run or long-run marginal cost pricing. Given the ambiguities in ADB's position, a tariff policy is consistent with ADB's position if it encourages technical efficiency, acknowledges the relevance of pricing to promote efficient water use, and takes a sensible position on how to apply it. (See Dole 2003 for more discussion on ADB's position on economic efficiency.)

### (b) Tariff policy for water districts

Policy does not mention technical efficiency and is vague about setting economically efficient tariffs. Policy would be stronger if it endorsed technical efficiency, and gave specific advice on how to set economically efficient tariffs.

Despite the weakness in efficiency, policy is strong on metering, a prerequisite for efficient pricing. Since efficient pricing is based on usage charges, efficiency requires metering. The water utilities act requires "100% metering to insure correct charging of water actually consumed and to discourage its wasteful use" (Office of the President 1978b, Section 1h). The Administration supports replacing meters every 5 years, or more frequently as needed (LWUA 2004a). The act does not define "wasteful use", and "wasteful" seems more relevant

to distributive justice (a value judgment on how much water people deserve or need) than to efficiency.

The water rates manual lists "water conservation" as one of the goals of tariffs, and defines conservation as covering "full utilization of system capacity" and "efficient allocation of water" (Dumpit and Sambo 1994, 2). The manual describes efficiency as "discouraging unreasonable and wasteful usage of water" (Dumpit and Sambo 1994, 2). Like the act, the manual's definition of efficiency seems more relevant to distributive justice than to economic efficiency.

The manual's support for setting rates to encourage "full utilization of system capacity" is consistent with short-run marginal cost pricing. Short-run marginal cost pricing involves higher prices when capacity is scarce, and lower prices when there's excess capacity to encourage use of idle capacity. The term "full utilization of system capacity" sounds more relevant to pricing with excess capacity, but it's unlikely that any water utility in the Philippines has excess capacity. Meanwhile, many utilities (including Cebu Water) lack capacity. Policy would be stronger if it endorsed pricing to manage demand, rather than just for "full utilization of system capacity", and if it specifically advised how to set prices to manage demand.

The economic cost of disposing wastewater is included in the efficient usage charge even if there are no sewers or wastewater treatment. The water utilities act says that a water district may collect charges for "sewer services" (PD 198, Section 38). That might mean that charges are allowed only for sewers and wastewater treatment, and not for the economic cost of disposing treated or untreated wastewater in the environment. The water rates manual does not discuss sewerage or environmental charges, and we did not find any other sign of such charges in tariff policy for water districts.

The opportunity cost of raw water should also be included in the efficient usage charge, even if the utility does not have to pay for raw water. The "Water Code of the Philippines", however, does allow the government to collect charges for using raw water (Malacañang Palace, Article 83). The National Water Resources Board collects the charges, which include a fixed charge and a variable charge based on the maximum rate of withdrawal in the permit. The variable charge increases with higher withdrawals; the highest charge is P5.50 per liters/second for withdrawals above 50 liters/second (personal communication, National Water Resources Board). We do not know the basis for the raw water charges, but the charges are probably not based on the opportunity cost of raw water.

When capacity is scarce (as it is in Cebu), short-run marginal cost pricing calls for the system to be managed to maintain adequate water pressure for all connections. Maintaining adequate pressure requires a combination of pricing to limit consumption, especially during peak periods, and capacity expansion when peak pricing is high enough to justify the extra investment in capacity. (Section IIE has more discussion of applying short-run pricing to manage demand.)

Since consumption and pressure vary through the day, marginal usage charges could vary similarly, with charges increasing during peak periods. Peak flow pricing would require time-of-use metering, and such meters may be economically justified only for the largest users. The economic justification for peak pricing and time-of-use metering can be investigated using standard economic methods, similar to those used in investigating meters in general (Hanke 1982).

## 2. Tariff Setting in Cebu Water

### (a) Technical efficiency

Cebu Water's technical efficiency has been gradually improving, and is comparable to other water suppliers in Asia. The systems recovery rate was 68% in 2004, up from 62% in 1995. Cebu Water expects the rate to increase to 73% over the next few years, the result of its capital investments. In 2004 Cebu Water had 6.14 staff per connection, down from 9.3 in 1995. A study done in 1995 found that the systems recovery rate for other water suppliers in Asia was 60% on average, and the number of staff per connection was 11.8, so Cebu Water's efficiency was slightly above average for Asia (ADB 1997). Some Asian cities have system recovery rates above 90% with comparable staff per connection, though, so Cebu Water's efficiency could be much higher.

Collection efficiency is also a relevant measure of technical efficiency. Section IIB above discussed Cebu Water's collection efficiency, which has recently been about 95% of billing, and more than 99% of accounts. The higher rate for accounts means that accounts with large bills are less likely to pay than accounts with small bills. Cebu Water's collection efficiency could be further evaluated by analyzing delinquent accounts. We do not know how Cebu Water's collection efficiency compares to other water utilities in Asia.

### (b) Allocative efficiency

The demand for water in Cebu exceeds installed capacity at current usage charges. Cebu Water estimates a shortage in supply of about 25,000 m<sup>3</sup> per day (AyalaCorp and Stateland 1997). The survey conducted for this study included areas that Cebu Water identified as having low pressure; 25% of the households in those areas reported low pressure and periods with no water. The demand for new connections continues to be unmet. Cebu Water estimates it can install 7,200 new connections in 2005, and 14,400 per year from 2006 to 2009 if it can tap new water sources (MCWD 2005c). A water audit is an important part of evaluating a utility's current capacity and the demand for new connections. (See ADB 2004b for information on conducting water audits, and ADB 2005 for an example of a water audit.)

In a congested system like Cebu's, there are at least two options for setting tariffs to efficiently allocate the scarce water across users. One option is to set the marginal usage charge at the long-run marginal cost of water use, and expand capacity until the system is no longer congested. In this option of "long-run marginal cost pricing", usage charges are stable, but the system stays congested until enough capacity is installed. Another option is to raise marginal usage charges to cut congestion, and then lower charges gradually as capacity expands. Under this option of "short-run marginal cost pricing", marginal usage charges are high at first, but total charges need not be high; the quality of service is stable; and usage charges fall in the long run. We discuss long-run marginal cost pricing first.

### (c) Long-run marginal cost pricing

The long-run marginal cost of water is calculated relative to the least-cost expansion plan (Hanke and Davis 1973; Hanke 1978, 1981, and 1982). Cebu Water does not have a least-cost expansion plan, though, and it is beyond the scope of this study to develop one. The best information at hand is the lowest average cost of new water. The lowest average cost of new water is generally not a good approximation of the long-run marginal cost, though it is the standard one used in economics (ADB 1999a).

Cebu Water has investigated several options for expanding its water supply. These include a dam and reservoir on the Mananga River (Bechtel International Inc. USA 2002); buying bulk water from a private source on the Luyang River in Carmen (AyalaCorp and Stateland 1997); piping raw water through an undersea transmission line from the neighboring island of Bohol (Root 1990); and rainwater harvesting and other proposals that have not yet been the subject of feasibility studies. Among these potential sources of new water that have been studied, the cheapest is the bulk water from Luyang River, with an average economic production cost of P15.75 per cubic meter.

The average total cost is the production cost plus the opportunity cost of raw water and the economic cost of water disposal. The competing uses of water from the Luyang River are for leisure activities (resorts), aquaculture, and industrial uses (AyalaCorp and Stateland 1997, Annex A). The opportunity cost of raw water may be significant, but no information is available to estimate it. Cebu Water pays the standard charge to the National Water Resources Board for diverting raw water, but that charge is probably more of a tax for raising revenue than one based on the opportunity cost of raw water, as mentioned above.

The economic cost of disposing wastewater is the lower of the cost of environmental damage caused by untreated wastewater, or the cost of treating wastewater plus any environmental damage caused by discharge of treated wastewater. In the survey conducted for this study, around 90% of respondents said that wastewater disposal causes problems in the city and surrounding environment. The cost of wastewater treatment is about P10 per cubic meter, based on the average cost of treatment in small package plants recently installed in Manila (ADB 2004a, Appendix 8). In Cebu, the Ayala Business Center treats wastewater in a small treatment plant at an average (financial) operating cost of P6.90 per cubic meter. The plant operator estimates that including capital costs would raise the cost to P10 per cubic meter. Most respondents in the survey were willing to pay an extra P10 per cubic meter of water to pay for wastewater treatment (currently there are no wastewater charges in Cebu, either for sewerage or maintaining septic tanks). Presumably this means that most people consider the cost of environmental damage from wastewater at about P10 per cubic meter.

Accurately estimating the environmental cost of water use and wastewater disposal requires a detailed study that is beyond the scope of this study. An accurate estimate would identify environmental impacts and measure their economic cost. The current results show only that the cost of wastewater disposal could be a significant proportion of the economic cost of water use, and so should be studied further.

Adding P10 per cubic meter to the least average cost of new water (P15.75) gives a total of P25.75 per cubic meter. This is an underestimate, though, since it does not include

the opportunity cost of raw water. Estimating the long-run marginal cost from the information at hand is accurate perhaps to only one significant digit, so the long-run marginal cost is probably about P20 to P30 per cubic meter.

Despite the uncertainty in the estimate of long-run marginal cost, it is clear that the marginal usage charge for most water consumed is above the long-run marginal cost. Table 6 shows the distribution of water consumption per connection for 2004. The table shows that 2.206 million cubic meters per month are consumed by customers using more than 30 m<sup>3</sup> per month; these customers will pay the highest marginal usage charge of P38.61 per cubic meter. The total monthly consumption is 3.295 million cubic meters per month, so two-thirds of the monthly consumption (2,206/3,295) is billed at a marginal usage charge of P38.61. Under the proposed tariff increases, the highest marginal usage charge will rise in real terms to P50 per cubic meter, so marginal usage charges for most water use will almost surely be well above the long-run marginal cost.

#### **(d) Short-run marginal cost pricing**

Long-run marginal cost pricing focuses on usage charges for the future, whereas short-run marginal cost pricing focuses on setting usage charges for the present. In a congested system, the aim of short-run marginal cost pricing is to use prices to preserve service quality. Also, congestion that is not managed with prices leads people to try other, more costly ways to satisfy their unmet demands.

Using prices to manage the system has several requirements. First, the distribution system must be properly designed, maintained, and operated so that it can meet the targeted service quality at its given capacity. This is an engineering matter, involving sizing of mains, pumps, distribution reservoirs and other capital investments, as well as monitoring and repairing leaks and performing regular maintenance. Cebu Water reports that the distribution system is adequate, and that all technical or engineering measures to managing pressure have already been applied, so pricing has the technical potential to manage demand.

Second, it must be legally valid and publicly acceptable to set charges to manage demand. As noted in the policy analysis above, the water utilities act discourages “wasteful” use of water. Using prices to manage demand in the short run may require all customers to cut their water use, including those doing their best to conserve water and use it efficiently. Managing short-run demand may therefore not be a legally valid way to set usage charges, since it applies even to customers who are not “wasting” water.

Customers might also oppose higher usage charges aimed at managing demand. In the survey of household customers, no one volunteered demand management as a basis for setting tariffs. As mentioned in Section IIA above, in the survey conducted for this study most respondents opposed the higher charges. Using charges to manage demand in the short-run would require a program to inform the public about the potential benefits. If informal discussion showed that was an acceptable basis for setting charges, then formal public hearings would follow, with demand management as one of the explicit bases for higher charges.

Third, using prices to manage the system is constrained by the need to keep people connected to the system, avoiding the problems from people developing their own supplies.

In some conditions it may be useful to set prices high enough so that people have the incentive to develop their own supplies. In Cebu, though, raising usage charges beyond a given level could undermine the system.

Higher usage charges could cause some customers to develop their own groundwater sources. Groundwater provides 92% of Cebu's water (MCWD 2004a, 6). Cebu is close to the sea, so extracting groundwater at too high a rate could draw saline water into aquifers. Cebu Water monitors and manages its own wells to ensure that it does not overextract. Some wells have been abandoned because of saline pollution, but for the most part Cebu Water has successfully protected its aquifers. Private wells could complicate Cebu Water's management of groundwater, and threaten the quality of Cebu's raw water sources.

To avoid the risks of driving people to use private wells, the average charge for piped water should be less than the average cost of developing a private well. The cost of developing a private well capable of delivering 30 m<sup>3</sup> per month in Cebu is P138 per cubic meter (see Section IIE below). That is more than three times the highest usage charge in the current tariff, so there is plenty of room to raise charges without causing problems in managing groundwater.

The final requirement for using prices to manage congestion is that customers must be sufficiently sensitive to price so that they cut their peak use and total use to the system's capacity. Total demand may be more sensitive to price than peak demand, so demand analysis should consider each separately. If pricing can reduce total demand to the system's capacity, but peak demand still exceeds capacity, then service quality may not improve, and short-run marginal cost pricing may not be relevant.

The survey conducted for this study shows that it may be possible to use prices to manage Cebu's demand for water. The survey asked respondents to interpret their water bills, including the fixed charges and usage charges. Almost all customers knew how their water bill would change if they consumed one extra cubic meter; this shows that customers understand marginal usage charges. The survey also asked respondents how their water use would change if their charges increased by 10%. The price elasticity of demand ranged from 0 to more than 7, with an average elasticity of 1.6; the survey data does not give a reliable estimate of the elasticity. About two thirds of respondents said they would reduce their peak use, and two thirds said they would cut their total use. This shows that pricing may be able to reduce demand, and that it could help cut congestion in peak periods.

As discussed in Section IIB, Table 6 shows that two thirds of Cebu's water is consumed by customers paying the highest marginal usage charge; two thirds of that, or 45% of the total, is consumed by customers with half-inch meters. Cebu Water should observe the effect that the annual increases in usage charges have on use per connection, focusing on customers using more than 30 m<sup>3</sup> per month, and evaluate the potential for using prices to manage demand.

If pricing is not able to reduce demand and improve service quality, then short-run marginal cost pricing would call for marginal usage charges to be at least short-run marginal production costs. In a system with more than one source and treatment plant, the short-run marginal production cost is that of the source and treatment plant with the highest marginal cost.

For Cebu Water, the source and treatment plant with the highest cost comes from a private supplier, Mactan Rock Inc., based on Mactan Island. Mactan Rock extracts brackish water from an underground cave near the sea. The raw water is saline and requires treatment through desalination, an expensive process that is used in municipal water supply only in exceptional circumstances. Groundwater sources are extremely scarce on Mactan Island. Cebu Water considered other options to bring water to Mactan Island, including long transmission lines carrying water from the main island of Cebu, but desalinization was found to be the least-cost option.

The short-run marginal production cost of Mactan Rock is easy to estimate. The raw water has no other economic use, so the marginal opportunity cost of the raw water is zero. The contract stipulates that Cebu Water will purchase 5,000 m<sup>3</sup> of water per day from Mactan Rock, at P24.56 per cubic meter. If the plant is run at maximum profit, it should be designed to produce the contracted amount of water, and will run at full capacity; inspection of the plant confirmed that it runs at full capacity and produces 5,000 m<sup>3</sup> per day. Under those conditions, the average and marginal production costs will be equal, and will equal the sale price. Transfer payments are estimated as P0.75, giving a marginal economic production cost at the plant of P23.81 per cubic meter. Cebu Water spends an extra P4.17 per cubic meter for further treatment with soda ash, because of problems caused by the reaction of desalinated water with the materials in the transmission mains. The short-run marginal production cost of water is therefore P27.98 per cubic meter. Adding P10 for the cost of wastewater disposal (as discussed under long-run marginal cost, above) gives a short-run marginal economic cost of P37.98.

As discussed above under long-run marginal costs, two-thirds of water is consumed at the highest usage charge, P38.61 per cubic meter, slightly above the estimated short-run marginal production cost. Under the proposed tariff increases, the highest marginal usage charge will increase in real terms to about P50 per cubic meter. In the future, most water consumption should be well above the short-run marginal production cost.

## **E. Fair Pricing**

Policy strongly supports fair pricing. It endorses the equitable distribution of costs, and gives advice on how to do it using customer classes. Policy encourages cross-subsidies from the rich, but does not allow cross-subsidies for connection costs, the most important kind of subsidy for helping the poor satisfy their basic needs. Policy could be more flexible on collecting connection costs from poor customers, and could be clearer on using customer classes to allocate shared costs.

Cebu Water's tariff is consistent with policy and seems fair. The tariff does not have customer classes, lowering the potential for unfair cross-subsidies. On average, customers pay for all their direct costs, but pay less than the cost of self-supply. The full relationship between customers and costs is unknown, but customers with the smallest connections may be subsidized at the rate of P6 per cubic meter, and customers with larger connections may be paying cross-subsidies at the rate of P20 per cubic meter. Cross-subsidies could be investigated further by estimating how different connection sizes affect overhead. Table 11 outlines the detailed review and the recommendations of this section.

**TABLE 11**  
**REVIEW OF FAIR PRICING POLICY AND PRACTICE**

	<b>SUMMARY</b>	<b>RECOMMENDATIONS</b>
<b>Policy</b>	Supports cross-subsidies from the rich, but no cross-subsidies for connection costs Charges commensurate with costs  Fixed charges vary by customer class and meter size	Allow cross-subsidies for connection costs  Explain basis for conversion factors in customer classes and fixed charges
<b>Practice</b>	Fixed charges vary by meter size; no customer classes Everyone pays direct costs, but less than stand-alone costs Half-inch connections probably get cross-subsidies	Waive fixed charges for the customers using only basic needs Investigate relationship between overhead and meter size

## 1. Policy Analysis

### (a) ADB's position

ADB does not have an explicit position on fairness. If fairness means that everyone pays the cost they impose on the utility, then a tariff without cross-subsidies should be fair. ADB discourages cross-subsidies in tariffs, and so at least indirectly supports fairness. ADB does not have a strong position against cross-subsidies, though, and a tariff with explicit, specific, and justified cross-subsidies would be consistent with ADB's position. ADB's strongest position on cross-subsidies is that such subsidies should not interfere with economic efficiency; cross-subsidies applied through fixed charges would be consistent with ADB's position. (See Dole 2003 for more discussion of ADB's position on fairness.)

### (b) Policy for water districts

The water utilities act also does not have a clear position on fairness. The act endorses (or possibly even requires) cross subsidies through "socialized pricing ... whereby the more affluent, heavy users pay more per unit than the low income, minimal users of water" (Office of the President 1978b, Section 1a). That might be viewed as a position against fairness, if fairness means that everyone pays their own costs. But fairness could also be defined as everyone paying their own costs except for explicit, deliberate subsidies (Dole and Bartlett 2004). The water utilities act endorses deliberate cross-subsidies from the rich, so the act is consistent with that broader definition of fairness.

The water utilities act might not, however, allow cross-subsidies for connection costs. The act says that new customers should reimburse the utility "for the cost of installation of new services and meters" (PD 198, Section 37). The water rates manual cites that statement in the act (Dumpit and Sambo 1994, 2), and says that connection charges should "recover the cost of connecting the customer's line" (Dumpit and Sambo 1994, 61).



There are several problems with the manual's position on connection charges. First, the water rates manual seems to say that customers must pay connection charges soon after they are connected. That can be hard for poor customers, as discussed in Section IIC, and so can make it harder to help the poor get connections and to satisfy their basic needs for water. Second, there is no reason to associate connection costs with connection charges. Connection costs are among the many types of fixed costs, but no other fixed costs are collected at the time a customer connects. Customers can reimburse the utility for connection costs through the tariff, as they do for all other fixed costs. And third, it does not make sense to allow cross-subsidies for other costs but not for connection costs, especially when collecting connection costs soon after connection is a barrier to helping the poor satisfy their basic needs for water.

Aside from problems with the policy on connection charges, the water rates manual strongly supports fair pricing. The manual says "rates must be fair and reasonable", and one of the goals of tariffs is "to equitably distribute the cost of service" (Dumpit and Sambo 1994, 1-2). The manual also notes that the "basic premise" in setting tariffs is that "they should reflect the cost of providing water service" (Dumpit and Sambo 1994, 16), and a "primary consideration" in setting tariffs is "equitable charges to customers commensurable with the costs of providing that service" (Dumpit and Sambo 1994, 26).

An unstated premise of the manual is that everyone gets the same level or quality of service. Service quality can vary across customers even if costs per customer are the same. For example, the costs of installing and maintaining connections are the same for customers with 24-hour supply and those with irregular supply. If costs are the same but service quality varies, then charging by cost could be unfair by a broader standard of fairness. The manual should stress the importance of service quality, and where service quality is not the same across customers, could propose a way for basing charges on costs and service quality. One disadvantage of charges that depend on service quality is that it could give utilities an excuse or even an incentive not to improve poor service. The best solution is to ensure that service quality is the same for all customers.

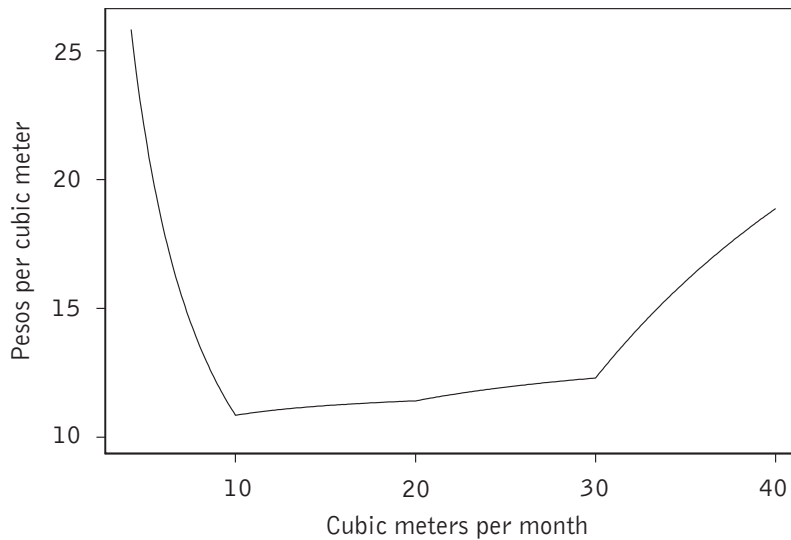
The manual discusses methods of fairly allocating costs. The manual says that fixed charges should "cover fixed costs" and vary "in proportion to the size of the meter" (Dumpit and Sambo 1994, 9-10). The manual recommends specifically how fixed charges should increase with meter size (Dumpit and Sambo 1994, 22). The manual also says that usage charges should "cover expenses related to production, distribution, and all other costs" not covered by the fixed charge (Dumpit and Sambo 1994, 10). (This is consistent with how fixed charges and usage charges would be set under short-run marginal cost pricing, if "all other costs" include the opportunity cost of raw water and the economic cost of wastewater disposal.)

The manual also discusses allocating costs to four "functional components of service": (i) fixed costs directly associated with customers, or "customer costs"; (ii) long-run variable costs, or "commodity costs"; (iii) costs of serving peak demand, or "demand costs"; and (iv) costs of fire protection. The "commodity costs" are those costs directly associated with production, including the capital cost of facilities "sized principally to meet annual supply requirements" (Dumpit and Sambo 1994, 17). The manual apparently uses the term "peak demand" to cover all other shared costs, including the costs of treatment plants and transmission lines. How to assign capital costs to "commodity costs" or "demand costs" is not clear, but

it might not be relevant or realistic to have a specific description of such assignments in a policy document; specific cost allocations probably need to be made in context.

The manual recommends allocating costs to customers through customer classes. The manual recommends six customer classes, including a "commercial/industrial" class broken into four sub-classes. The definitions for each class are specific; for example, the "Commercial" class includes hotels, bars, and restaurants, while the "Commercial-B" class includes *sari-sari* stores and "other premises utilized for selling foods or ... for living quarters" (Dumpit and Sambo 1994, 12).

FIGURE  
AVERAGE CHARGE PER CUBIC METER FOR A HALF-INCH METER



Source: Estimated from the tariff structure on Table 1.

The manual is confusing, though, on how the charges and costs for customer classes are related. On one hand, the manual seems to recommend allocating “customer costs” through fixed charges per meter; “demand costs” through fixed charges per customer classes; and “commodity costs” through usage charges. On the other hand, the manual recommends specific “conversion factors” that give the fixed charge per meter relative to the smallest meter, and the fixed charge per customer class relative to the residential class. If there is a relationship between costs and the manual’s conversion factors for all systems, the manual does not explain it.

Customer classes can be useful in setting fair charges, when the classes and charges are based on costs per customer. Although customer classes can be fair, they may also promote corruption. Customers that are potentially in the classes with higher charges will want to shift to a class with lower charges. They can do that by misrepresenting themselves to the utility, or by bribing officials to put them in the class with lower charges. When corruption is a problem, the tariff will be unfair in practice, even if it is fair in principle.

Another aspect of fairness, not directly related to the tariff, is fairness of access to the system. A tariff can be fair for everyone with connections, but people without connections also need water, and usually have to pay much more per unit. As discussed above, the policy against cross-subsidies for connection costs prevents the tariff from being used to help the poor get connections.

## **2. Tariff Setting in Cebu Water**

Cebu Water’s tariff is unusual in not including customer classes, despite the recommendations in the water rates manual. Customer classes are common in water tariffs across Asia and elsewhere, and for other types of public services besides water (Dole 2003). Cebu Water dropped customer classes because of problems with corruption.

We think the lack of customer classes is a good feature of the tariff. Customer classes are usually for distributive goals (like “socialized pricing”), where some customers cross-subsidize others. Cross-subsidies are hard to justify in principle, but applying the principle as intended can be even harder. When distributive goals are important, the best way to reach the goals should be found by reviewing various options. The tariff might not be the best option, and it should not be taken as the only option.

Although the tariff does not include customer classes, it does include different charges based on the size of a customer’s water meter. Basing charges on something easily observable like the size of the meter lowers the potential for corruption. The charge per meter size affects only the fixed charge; the usage charge is the same for all customers. Hence, cross-subsidies based on meter size do not affect economic efficiency, and so would be consistent with ADB’s position.

### **(a) Average charges**

The following evaluates a tariff’s fairness through the average charge. The analysis is based on all connections getting the same service quality. We know, however, that some

connections have interrupted supply. The following analysis applies mainly to connections with continuous supply, so any unfairness among those connections is compounded for connections with interrupted supply. Cebu Water should try to improve service quality for customers with interrupted supply, for fairness and other reasons.

One way to evaluate a tariff's fairness is to compare the average charge with the cost of developing one's own water supply. A simple standard for fairness is that the average charge should be less than the average cost customers would face in supplying their own water, or the "stand-alone" cost. That standard for fairness is relevant when customers are required to connect to the service; it is perhaps more relevant to public services like sewerage than for water supply, since there are good reasons to make people connect to public sewers. When connecting is optional, the standard is more relevant as an incentive to connect.

Table 12 shows the average charge per cubic meter for each connection size, based on average use per month, and using charges from the tariff in 2004. Except for half-inch meters, the average charge for each meter size is about P40 per cubic meter. The average charges are close to each other because average use per meter is well above the start of the highest marginal usage charge (30 m<sup>3</sup> per month).

**TABLE 12**  
**AVERAGE CHARGE PER METER SIZE BASED ON TARIFF, 2004**

<b>METER SIZE (inches)</b>	<b>FIXED CHARGE (pesos/month)</b>	<b>AVERAGE USE (m<sup>3</sup>/month)</b>	<b>AVERAGE CHARGE<sup>a</sup> (pesos/m<sup>3</sup>)</b>	<b>MARGINAL CHARGE<sup>a</sup> (pesos/m<sup>3</sup>)</b>	<b>AVERAGE FIXED<sup>a</sup> charge (pesos/m<sup>3</sup>)</b>
0.50	108.51	26.1	12.63	14.07	4.16
0.75	175.97	194.3	40.48	38.61	0.91
1.00	344.60	1195.5	38.67	38.61	0.29
1.50	879.83	810.5	39.60	38.61	1.09
2.00	2184.92	909.9	40.89	38.61	2.40
3.00	3929.92	2226.1	40.42	38.61	1.77
4.00	7859.84	3750.0	40.55	38.61	2.10
6.00	11782.42	11118.2	39.34	38.61	1.06

<sup>a</sup> Based on average use.

The relevant comparison between stand-alone supply and supply from Cebu Water is the average total cost of each. Stand-alone supply includes the cost of drilling a well and installing the equipment to pump and treat water. Those costs are comparable to the costs of connecting to Cebu Water, so the average charge for Cebu Water has to include connection costs. Connection cost is therefore included in the average charge in Table 12, by amortizing connection costs into an extra monthly fixed charge so that the present value of the extra fixed charge equals the connection cost.

We have information on only two different wells: a well comparable to a half-inch connection, and a well comparable to a three-inch connection. Cebu Water provided the cost estimates for both. The average cost of a well comparable to a half-inch connection is P138.86 per cubic meter, and the average cost for a well comparable to a three-inch connection is P353.17 (the bigger well has a longer expected life) per cubic meter; both costs are more

than Cebu Water's average charge for average consumption from both connections (at P40 per cubic meter).

It is also useful to examine the average charge across a range of consumption for half-inch connections. The average monthly consumption for half-inch connections is less than 30 m<sup>3</sup>. Marginal usage charges increase up to 30 m<sup>3</sup>, and so the average charge changes significantly over that range. Figure 1 shows the average charge for half-inch connections consuming between 1 and 40 m<sup>3</sup> per month, based on the tariff in 2004. The lowest average charge (the lowest unit cost) occurs at about 30 m<sup>3</sup> per month. Customers consuming in the range of basic needs (below 10 m<sup>3</sup> per month) pay more on average than customers consuming up to 20 m<sup>3</sup> per month.

The average charges for half-inch meters do not seem consistent with policy. Average cost probably decreases with higher use, so the average charges for half-inch connections are probably not "commensurable with the costs". Charges can vary from costs and still be fair, if the subsidies are deliberate and explicit. The "socialized pricing" of the water utilities act, however, calls for the poorest customers using the least water to pay less per unit than others. Instead, the poorest customers using the least water (less than 10 m<sup>3</sup> per month) probably pay more per unit.

Charges for half-inch connections could be consistent with policy if connection costs were amortized into fixed charges, and if fixed charges were waived for customers consuming only in the lifeline block. The fixed charges would have to be the same across customers with a given meter size, and so connection costs could be included in fixed charges only by using the average cost, not the actual cost. That would break the direct connection between connection cost and connection charge, and so might violate policy (as stated in the water rates manual, but not necessarily the water rates act).

Evaluating average charges further calls for comparing charges to the cost of providing the given level of service. In the following, we compare charges to two kinds of costs: direct costs and overhead.

### **(b) Direct costs**

Direct costs are those costs that are clearly associated with specific customers. For municipal water supply, there are three kinds of direct costs: connection costs, administrative costs, and consumption costs.

Cebu Water records the labor and materials involved in connecting a customer. Following policy, it charges customers for the labor and materials at cost. The connection charge also covers the cost of the meter.

Administrative costs are the fixed costs associated with reading meters, billing customers, and other things involved in administering a customer's account (the water rates manual calls this "customer costs"). Cebu Water reports that there are no significant differences in the administrative costs associated with different customers or different meter sizes. The average monthly administrative cost is about P25 per meter. The average consumption of customers with half-inch connections is 26.1 m<sup>3</sup> per month, so administrative costs are on average less than P1 per cubic meter even for connections with the smallest average consumption.

**SETTING USER CHARGES FOR URBAN WATER SUPPLY:  
A CASE STUDY OF THE METROPOLITAN CEBU WATER DISTRICT IN THE PHILIPPINES**  
*DAVID DOLE AND EDNA BALUCAN*

Consumption costs are those associated with a customer's water use (this includes only the short-run variable costs in the manual's "commodity costs"). All customers have meters, and so the costs of delivering water can be traced to each customer. The cost of delivering water to a customer includes the variable costs of chemicals used in treating water; power used in pumping and operating the treatment plants; and water purchased from private suppliers. Table 13 shows the variable costs by type of cost. Averaging those costs over total production gives a cost of P4.16 per cubic meter in 2005 (including revenue sharing and reserves). The lifeline block (where there is no usage charge) has the only usage charge below average variable costs.

**TABLE 13**  
**CEBU WATER'S ACTUAL (2004) AND PROJECTED VARIABLE COSTS AND OVERHEAD (IN MILLIONS OF PESOS)**

	2004	2005	2006	2007	2008	2009
<b>Variable costs</b>						
Chemicals	4.08	4.46	4.98	5.63	5.54	6.06
Power	63.41	74.21	78.42	78.85	81.36	82.17
Bulk water	58.34	117.39	156.28	158.73	557.67	683.02
Revenue share	3.89	8.02	10.20	12.48	16.12	19.82
Reserves	23.51	24.07	30.59	37.43	48.35	59.46
Subtotal	153.23	228.15	280.47	293.12	709.03	850.53
Average per cubic meter billed	4.14	4.16	4.62	4.48	9.53	10.55
<b>Overhead</b>						
Office supplies	3.31	2.80	3.25	3.85	4.49	5.19
Training	3.01	4.56	4.78	5.02	5.69	6.55
Maintenance	23.98	43.21	50.77	63.87	80.16	100.68
Other disbursements	101.53	116.48	139.16	166.53	202.18	239.85
Capital outlays	96.34	193.65	488.65	575.00	352.50	235.67
Debt service	193.69	194.90	168.95	221.88	270.77	291.89
Labor	280.28	268.24	290.58	304.46	343.55	394.00
Subtotal	702.14	823.84	1146.14	1340.61	1259.34	1273.83
Average per cubic meter billed	18.99	15.02	18.86	20.48	16.92	15.80
Total	855.37	1051.99	1426.61	1633.73	1968.37	2124.36
Average per cubic meter billed	23.13	19.18	23.48	24.96	26.45	26.36

Source: MCWD (2005c).

A minimum standard of fairness is that all customers pay at least their own direct costs. This holds for all of Cebu Water's customers. As mentioned above, every customer pays the full connection cost. The administrative cost, P25 per connection per month, is less than even the smallest fixed charge, P108.51 per half-inch connection per month (from Table 12). The usage charge is greater than the average variable costs except in the first block of the usage charge, where there is no charge. The direct cost for the first 10 m<sup>3</sup> of water is

$$P66.60 = P25 + P4.14 \times 10 = P25 + P41.40,$$

which is below the total charge of P108.51. So even customers consuming water only in the lifeline block pay more than their direct costs, and hence subsidize others.

### (c) Overhead

Overhead includes the fixed costs of goods, services, and facilities shared or jointly used by all customers. Cebu Water's overhead falls into several categories, as shown in Table 13. Overhead includes all labor costs, even though some labor can be directly associated with production costs. We did not have information on labor costs associated with production, so all labor is classified as overhead. This means that the direct costs are underestimated (by at most P5.29 per cubic meter in 2005), and the overhead is overestimated (by at most P210 per connection per month in 2005).

Cebu Water's overhead is allocated to customers through fixed charges and usage charges. As discussed above, usage charges exceed average production cost for all usage blocks except the lifeline block. Hence, usage charges cover part of overhead, with the rest covered by fixed charges.

Table 12 shows that usage charges overwhelm fixed charges in paying for overhead. Average charges are close to marginal usage charges, as discussed above. Except for half-inch connections, the average fixed charge makes up only about P1 to P2 of the total average charge of about P40. Table 13 shows that variable costs in 2005 average P4.16 per cubic meter. Subtracting average variable costs and average fixed charges from the average charge gives about P35 per cubic meter for all but the half-inch connections.

We have no detailed information on the relationship between overhead and meter size or water use, but it seems clear that charges are not based on costs. On average, customers with meters larger than a half-inch pay about same amount per cubic meter. That would be comparable with costs if overhead is proportional to average consumption. In that case, though, customers with half-inch meters should have the same average charge as others, but customers with half-inch meters pay less. Hence, charges cannot be based on costs.

It is likely that other customers subsidize the costs of those with half-inch meters. If overhead is proportional to use, then in 2005 the average cost per meter for all customers is P19.18 per cubic meter (see Table 13). Customers with half-inch meters using between 10 and 20 m<sup>3</sup> per month would be getting a cross-subsidy of about P6 per cubic meter; customers with larger meters would be paying a cross-subsidy of about P20 per cubic meter.

Cross-subsidies to customers with half-inch meters are probably intentional, based on the policy of "socialized pricing ... whereby the more affluent, heavy users pay more per unit than the low income, minimal users of water" (Office of the President 1978b, Section 1a). That policy is not clearly applied, though, since customers with half-inch meters are not necessarily "low income", and customers with larger meters are not necessarily "more affluent."

## F Conclusions

### 1. Policy Analysis

Policy for water districts is consistent with the five goals in ADB's position on setting tariffs for urban water supply. Policy encourages a process of tariff setting that should produce simple, transparent, and predictable tariffs. Revenues from tariffs are supposed to provide

enough funds so that water districts can meet all their financial obligations without external subsidies. Policy says specifically how to help the poor satisfy their basic needs for water. The basis for that specific requirement is unknown, but the requirement seems reasonable. Policy is strong on metering, a requirement for economically efficient charges, but like ADB's position is otherwise vague on efficiency. Policy strongly supports fairness, and is more explicit and detailed than ADB's position.

Policy could be strengthened in several areas. It could recommend that utilities (large ones especially) prepare asset management plans. Asset management plans would improve financial projections and long-term planning. Policy could take a stronger and clearer position on setting charges to promote efficient water use. It could require that usage charges be at least as high as the economic costs of water use, including the opportunity cost of raw water and the environmental cost of wastewater disposal. Policy encourages cross-subsidies from the rich, but does not allow cross-subsidies for connection costs. Probably the most important way to help the poor satisfy their basic needs is through cross-subsidies for connection costs, so the policy could be more flexible on collecting connection charges from the poor.

## **2. Tariff Setting in Cebu Water**

Cebu Water applies policy effectively in tariff setting. Cebu Water followed a transparent process in its latest rate proposal, and the public understands and accepts the basis for the current tariff and proposed changes (even if they dislike it). Cebu Water makes thorough forecasts of its future financial obligations, and revenue from the tariff should be enough to sustain the utility without external subsidies. The tariff provides a generous amount to help the poor satisfy their basic needs, at a charge that follows the policy's guidelines. The tariff could do more to help the poor by waiving the fixed charge for customers using only their basic needs for water; that change in the fixed charge is our only specific recommendation for changing the tariff.

Cebu Water's financial projections could be improved in two areas. First, the rate proposal will lead to significantly higher usage charges, possibly leading to lower water use per connection. Financial projections, however, are based on constant water use per connection. Cebu Water should monitor use per connection as charges gradually rise, and revise the projected water use accordingly. Second, projected capital outlays and depreciation charges would be more reliable if they were based on an asset management plan. An asset management plan can have many benefits for a utility as large as Cebu Water. Although not required in policy, Cebu Water could develop an asset management plan on its own.

The tariff probably gives the right incentives for efficient water use. Most water use faces the highest marginal usage charge, which is probably above the long-run and short-run marginal production cost. There is not enough information on the opportunity cost of raw water, the environmental cost of disposing wastewater, and the best opportunities for expanding water supply, so our estimates of long-run and short-run marginal production cost are uncertain. Usage charges might also be able to help manage the system by reducing water use especially during peak periods and helping to maintain pressure throughout the system. Monitoring the effects of higher usage charges may also provide useful information on using prices to better manage the system. The marginal usage charges will already be much higher under the rate



proposal, though, so better information on economic costs and demand may not lead to higher usage charges. Usage charges might have to be much higher to cut use.

The tariff is fair by broad standards of fairness. All customers pay more than the costs that can be traced directly to them, and pay less than the cost of developing their own water supply. We do not have enough information on shared costs, and so cannot fully evaluate whether shared costs are allocated fairly.

On average, customers with the smallest meters pay less per cubic meter than other customers, and all other customers pay about the same as each other. Policy says that the rich should pay more per cubic meter than the poor, but the poor probably pay more. It also says that charges should be based on costs. We do not know how meter size depends on cost, and it remains to be seen whether customers with the smallest meters are subsidized by customers with larger meters.

### III. DISCUSSION

This paper has presented a thorough and systematic analysis of a water tariff, covering all parts of ADB's position on tariffs. We believe the analysis here is always relevant for a tariff review, including a review for a project analysis. We have shown that the analysis is practical and feasible, and we believe it should be the standard for other tariff reviews by or for ADB, in urban water supply and other contexts. The details will vary in different contexts, so the analysis in this paper cannot be repeated the same way everywhere. As long as ADB's position is the same, though, every tariff review should consider all the issues raised in this paper.

We know our analysis is practical and feasible, but we also know that it takes time and effort. Ideally, a tariff review should be part of a sector study, with the sector study done before the feasibility study or project analysis. Policy analysis is especially relevant for a sector study, because the same analysis will apply to all projects in the sector. When a tariff review is not done before the feasibility study, it should start as soon as the feasibility study starts, so that it has as much time as possible, and so that the results can be used in project design and analysis. Thoroughly reviewing a tariff as part of a feasibility study might mean dedicating one person for the job. At the least it needs dedicated terms of reference. The Appendix contains our recommendations for terms of reference.

In our analysis we have raised all the questions that we think are relevant to Cebu Water's tariff. We have tried to answer all the questions, but for some of them we have been able to find only a plausible range of answers, because of limited information. We do not think it is realistic or necessary for a tariff review to find the perfect answer to every question. A thorough and relevant tariff review will always raise new questions, and so new information will be needed. If the review does not raise new questions, then the review is not relevant: either it is not raising the right questions, or all the relevant questions have already been raised.

A tariff study with enough time and funding might be able to answer all the relevant questions, but we do not think that it is necessary for a review to be relevant and useful. The main reason for ADB to review a tariff is to guide policy discussions. Discussion of the tariff is relevant when the government's policy and practice can be improved. Policy discussions can only expect to raise awareness and understanding, and help the government start changing

policy. Perfect answers to all the questions are not needed to start the process, and the lack of information on a topic might be the best way to show a government that it has not adequately considered that topic in its tariff policy or practice. A simple first step in advancing policy discussions would be to persuade the government to consider a study to collect more and better information, through a water audit and other ways.

In our review of Cebu Water's tariff, we found only a few, minor improvements in policy and practice. By our standards of the relevance of a tariff review, our study would be relevant only to show that the tariff would not be an important area of policy discussions with Cebu Water. We knew that before starting our study, but we offer our study only as an example of the process and not the outcome of a tariff review. We expect that other tariff reviews will find many areas for improvements. We also expect other tariff reviews to follow our example and recommend changes only where they are fully justified, and with the right perspective on their relevance.

Although we knew our study would not be relevant to policy discussions with Cebu Water, we chose Cebu Water's tariff as the subject of our study for two reasons. First, to have at least some information on each part of ADB's position, so that we could demonstrate how to analyze and present that information. And second, to show that ADB's position is realistic and relevant to tariffs for urban water supply in developing countries in Asia. Cebu Water's tariff is a good model for other tariffs to follow, and even goes beyond ADB's position on tariffs—in Cebu Water's case, without ADB's help.

## APPENDIX MODEL TERMS OF REFERENCE FOR REVIEWING A TARIFF FOR URBAN WATER SUPPLY

Review and evaluate policy and practice in tariff setting relative to ADB's position on tariffs (see Dole 2003, and Dole and Bartlett 2004 for reference). The review of policy should include all relevant laws, regulations, manuals, and other policy documents related to tariffs. The review of practice for the given water utility should include recent history and any proposed future changes in tariffs. The review should cover the following areas:

- (i) *Review policy on the process of tariff setting, and identify the legal goals or basis for setting tariffs.* Review tariffs in the present political and social context, including the public's views, and identify any political or social constraints on tariffs. Describe recent history in tariff setting for the given water utility, and evaluate whether the current tariff setting process produces tariffs that are simple, transparent, and predictable.
- (ii) *Review policy on ensuring the financial sustainability of utilities, and evaluate how well policy encourages utilities to be financially independent and sustainable.* Review projected financial statements to evaluate whether the given utility will have sufficient funds to sustain its operations at the desired level of service in the short-run and long-run. Identify and evaluate any external subsidies, including the justification for and sustainability of any subsidies. Review and evaluate the utility's policy and practice on collecting charges. Estimate the distribution of customers per customer type, of revenue per customer type; and identify the utility's most important customers.
- (iii) *Review and evaluate policy on helping the poor satisfy their basic needs for water.* Estimate the basic need for water in the given utility's region. Identify society's standard for financial hardship in satisfying basic needs for water, and groups needing assistance. Review options for helping the poor, including how to help the poor connect to the system; and recommend how to help the poor satisfy their basic needs, through the tariff or other means. Compare service quality and price for poor with and without connections. Identify incentives and disincentives in policy and practice for helping the poor without connections.
- (iv) *Review and evaluate policy on promoting efficient water use, including metering and usage charges.* Review the given utility's technical efficiency, and evaluate whether the utility is doing enough to maintain or improve efficiency. Estimate usage charges for the given utility that promote efficient water use in the short run and long run. Compare efficient usage charges to marginal usage charges, and evaluate the efficiency of current water use.
- (v) *Review and evaluate policy on fairness or cross-subsidies, and identify any constraints that promote or hinder fairness.* Try to associate the given utility's costs with customers or classes of customers, including direct costs and shared costs. Compare associated costs with charges, identify any cross-subsidies, and evaluate the fairness of charges.

Use the review to recommend changes to policy, and to recommend the ideal tariff relative to ADB's position. Compare the recommended tariff to the current one, and recommend how to make changes in a politically and administratively feasible way.

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