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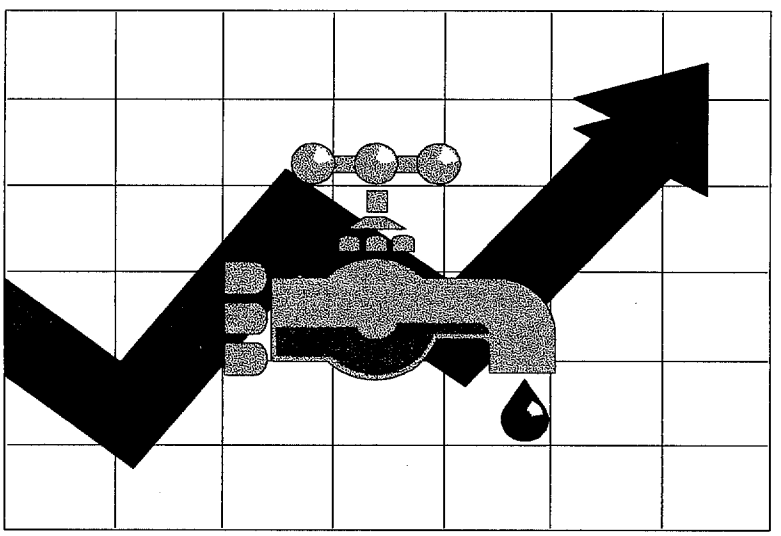
TECHNICAL ASSISTANCE FOR LOCAL LEVEL
COMMUNAL SERVICES PRICING IN RUSSIA

Orenburg Vodokanal Improving Cost Recovery, Tariff Reform, and Metering Demonstration Project



Prepared for
Government of Russia

Funded by
USAID/Russia

Prepared by
PADCO, Inc.

Contract No. CCS-0008-C-00-2057-00, TO 74
May 1996

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Forward

PADCO, Inc. prepared the following report for the City of Orenburg and Orenburg Vodokanal (water/wastewater agency), with funding provided by the United States Agency for International Development (USAID) under the auspices of the Shelter Sector Reform Program for the Newly Independent States (NIS).

The report seeks to help Orenburg Vodokanal become more financially self-sustaining. At the same time, much of the analysis and many of the recommendations can be applied to other vodokanals as well. Operating under a common legal framework, virtually all Russian vodokanals are plagued with recurring problems — institutional weaknesses, poor records of cost recovery, unsatisfactory relations with consumers, etc. Working to resolve those problems is in the vodokanals' best interests as service providers. Taking steps to become more financially self-sustaining will at the same time improve their creditworthiness. Enhanced creditworthiness will, in turn, help vodokanals qualify for water sector loans that may soon be forthcoming from multilateral development institutions.

The authors therefore submit this report with the intent that it will assist not only Orenburg Vodokanal but other vodokanals as well, in making the transition to full independence in management and control over water and sewer services, and in enhancing the financial soundness of their operations.

Chapter 1
Introduction and Overview of Water Service

PADCO, Inc. prepared this study for the United States Agency for International Development (USAID), the City of Orenburg and Orenburg Oblast, and the Government of Russia, under the Housing Sector Reform Program for the Newly Independent States.[1] The assignment, Technical Assistance for Local-Level Communal Services Pricing in Russia (Task Order 74), involved the full-time presence of a financial advisor in the City of Orenburg to assist the Orenburg Vodokanal (water/wastewater authority) between September 1995 and April 1996.

The primary objective of the assignment was to assist the Orenburg Vodokanal in improving the financial sustainability of its water service provision.[2] A key focus of the assignment was on helping the Vodokanal **improve cost recovery** via water tariffs. Cost recovery occurs when service providers calculate costs, set user charges, bill customers, and collect revenues in such a way as to fully capture the expenses associated with service provision. Requiring consumers to shoulder the costs of service in this way is said to follow the "user pays principle."

This emphasis on cost recovery in the water sector addresses a key concern in the transition from a command to a market economy now taking place in Russia. Under the former Soviet Union, water/wastewater services were largely subsidized by the central government. Consumers grew accustomed to making token payments for water service. As a reform measure, however, the Russian federal government is now requiring communal service providers (including vodokanals) to recover more and more of their costs from consumers — a fundamental shift in the relationship between service providers and customers. This policy accompanies drastic reductions in subsidies from the federal, oblast, and city governments.

With reductions in subsidies, recovering costs becomes crucial for providing water services. If costs are recovered, vodokanals will be able to provide acceptable levels of service. Moreover, as loans for capital investment in the water sector become available, a strong record of cost recovery will become a key demonstration of a potential borrower's creditworthiness. If costs are *not* recovered, however, water authorities will be forced to "use up" their working capital by forgoing necessary minimum maintenance and system renewal and replacement. Repairs will be delayed until they create service interruptions and involve costly emergency procedures. Vodokanals will not be able to honor their debts. The result will be a lack of creditworthiness and the ever-worsening quality of service.

Another key element of the assignment was a **metering demonstration activity**. This exercise was designed to test and demonstrate the feasibility of expanded metering of residential customers. Flow metering is not currently widespread in Russia. As part of a comprehensive reform package,

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[1] USAID/PADCO Contract No. CCS-0008-C-00-2057-00.

[2] See Task Order 74 Terms of Reference.

linking the amount owed by a customer to actual consumption of water may be of value from a variety of perspectives, including promoting efficiency, encouraging water conservation, increasing collections, and improving service administration. Establishing this link between consumption and the price paid by the consumer represents an important aspect of treating water as an economic good. The team also investigated other aspects of improving the financial sustainability of water provision.

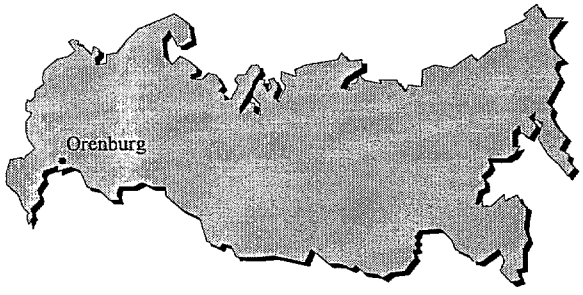
To introduce the study, the rest of *Chapter 1* presents an overview of water service provision in Orenburg and a profile of vodokanal customers. The study then proceeds as follows.

- *Chapter 2* analyzes cost recovery issues involved in providing water services.
- *Chapter 3* constitutes an economic analysis of the project, and describes the changes in the existing tariff structure needed to reduce cross-subsidies and wasteful consumption of water. In addition, it addresses the issue of enterprise non-payment.
- *Chapter 4* presents the preliminary results of the metering demonstration activity.
- *Chapter 5* offers recommendations.

1.1 Overview of Water Service Provision

The City of Orenburg (pop. 575,000) is the governmental, economic, academic, and cultural hub of Orenburg Oblast in southwest Russia (see Figure 1.1).

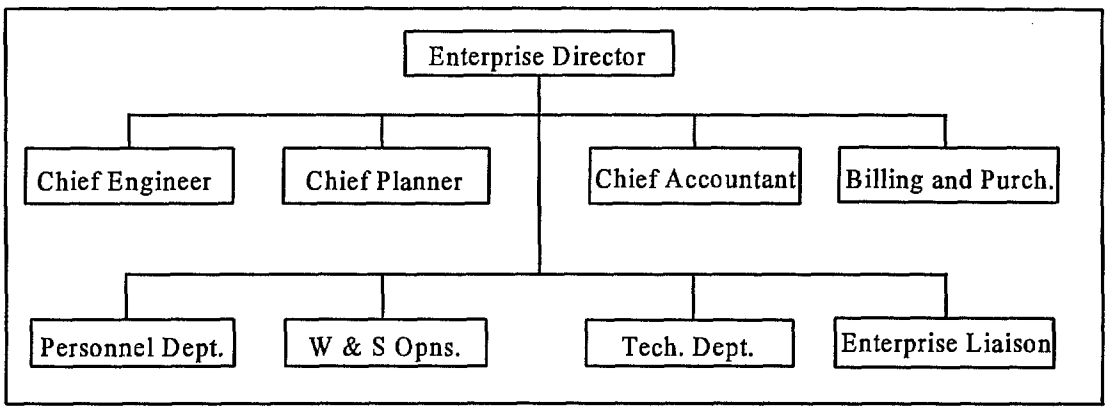
Figure 1.1



Water and wastewater services for most Orenburg consumers are provided by Orenburg Vodokanal Enterprise. The Vodokanal was established on June 8, 1992 as a municipal enterprise. While legally independent, Vodokanal responsibilities are limited and its autonomy severely circumscribed.[3] The Vodokanal does not own key system assets, nor is it responsible for extending and expanding the water system; those functions are controlled by the city. Tariffs conform to federal laws, while the city and oblast dominate the tariff-setting process. City interference in the day-to-day administration of the Vodokanal is fairly common. The city, oblast, and federal governments also retain other responsibilities, such as setting norms and standards of water quality. The Vodokanal is administered by a Director who is appointed by the city; there is no Board of Directors. For a simplified organizational chart, see Figure 1.2.

[3] This circumstance is typical of *municipal* enterprises, as opposed to *commercial* enterprises.

Figure 1.2
Orenburg Vodokanal Organization Chart (Simplified)



The Orenburg Vodokanal may be overstaffed compared to international standards, suggesting inefficiency. The Vodokanal supports a staff of approximately 1,023 full-time employees — about one employee for every 427 persons receiving service. This ratio is nearly five times higher than that of most European cities (one employee per 2,000 residents), and three-and-one-half times higher than the Latin American average (one employee per 1,500 residents). The ratio is, however, slightly better than the estimated national average for Russia (one employee per 380 persons).[4] In keeping with its high staff levels, the Vodokanal relies heavily on labor-intensive procedures, and uses manual, rather than computerized, management information systems.

Under current conditions, the quantity of water produced by the Vodokanal is inadequate for meeting demand. Water is produced by three city-owned well fields and one intake from the Ural River (see Table 1.1). Because of inadequate supply, additional water is purchased from two sources: Gazprom and a local rubber manufacturer (approximately 6%, on average, of the total water sold).[5] Water is purchased at unit costs that, according to Vodokanal calculations, exceed the costs of water supplied from its own sources. Funding sufficient to extend and expand the water system so as to meet the shortfall have not been dedicated.

[4] Source: World Bank, January 1996.

[5] Source: Vodokanal accounting records on purchased water. Total production figures were unavailable because of lack of metering at the source.

Table 1.1
Orenburg Water Supply

Source	Number of Wells	Transmission Line Capacity (cubic m./day)
New Sakmarskii Well Field	70	79,300
Ural Well Field	66	71,000
Old Sakmarskii Well Field	15	17,400
Ural River Intake	--	71,000
Purchased Water	--	8,190

Source: Orenburg Vodokanal.

The 519-kilometer (est.) system is in deteriorating condition. Equipment is old and is often not energy-efficient. The Vodokanal has had to increasingly respond to main line breaks and treatment facility equipment failure. Current high levels of water loss from transmission and distribution leaks contribute to the shortfall in water supply noted above.

1.2 Customer Profile and Demand

A *customer* is a person or entity legally responsible for paying for water service. Following national regulations, the Orenburg Vodokanal recognizes three major customer categories.

- *General population* — residential customers. This category can be further subdivided into: (1) buildings/units provided with both hot and cold water, and (2) buildings/units provided only with cold water (including single-family dwellings/private housing).
- *Budget organizations* — entities with budgets set by the city, oblast, or federal government (e.g., schools, medical institutions, civic establishments, etc.).
- *Enterprise/industry* — manufacturers, commercial and retail trade, and small businesses (e.g., cleaners, restaurants, etc.).

The Vodokanal provides most, but not all, water services enjoyed by these three water consumer classes. Three-quarters (74%) of all city residents, all (virtually 100%) of budget organizations, and half (51%) of enterprise/industries receive their water service from the Vodokanal.[6] Some enterprises themselves directly provide housing and communal services for their employees, instead of relying on the Vodokanal for water service.

[6] Source: Analysis completed by the Vodokanal Billing Department (February 1996).

As shown in Table 1.2, the general population accounts for two-thirds (67.5%) of overall consumption of water in the city. Enterprises, on the other hand, consume 22.2%, while budget organizations consume 10.3%.

Table 1.2
Customers and Water Use (1995)

Customer Category	Customers/Users			Water Use for Year	
	Number of Customers	Number of Persons	% of Customers	Cubic Meters	% of Total Volume
General Population					
- hot and cold water	--	248,104	--	23,932,546	--
- cold water only	--	189,000	--	11,474,100	--
Sub-Total	127,000	437,104	99.2	35,406,646	67.5
Budget Organizations	270	--	0.2	5,400,000	10.3
Enterprise/industries	798	--	0.6	11,640,000	22.2
Total	128,068	--	100.0	52,445,646	100.0

Source: Estimates from City of Orenburg Vodokanal; and PADCO, Inc.

As noted above, demand currently exceeds water supplied by the city's primary sources. This shortfall is expected to increase in the future. Assuming that water consumption parallels population growth, one can project future increases in water demand. Based on the average population growth rate of 0.6% per year, water demand in 2006 will be approximately 54,395,000 cubic meters/year. This projection may be low, given that the Vodokanal is currently increasing water purchases at higher rate than population growth, that industrial growth may accelerate, that households may install dishwashers and larger washing machines, etc.[7]

The conditions described above all point to deteriorating service conditions. The next chapter investigates how well the Vodokanal is recovering costs — a key condition to providing sustainable levels of water service.

[7] For discussion of water consumption versus water loss, and the potential impact of a tariff structure that would encourage conservation, see Chapters 3 and 4, below.

Chapter 2
Recovering Costs for Water Service Provision

The process of recovering costs associated with ongoing water use involves several steps. A vodokanal must first: (1) determine its total costs, (2) set tariffs so as to recover those costs, and (3) bill consumers and collect payments owed. Finally, it should (4) enforce collections from customers. These steps are explored in the following sections, followed by a discussion of (5) financing alternatives.

2.1 Determining Costs

The first step in recovering costs involves determining the full costs of providing water services. The costs that the Orenburg Vodokanal is allowed to reflect in its water tariffs are defined by laws and guidelines.[8] These costs are largely associated with system operations and maintenance and with plant renewal and replacement. The team identified two major expenses that the Vodokanal does not now account for as costs.

The Vodokanal does not include as costs the capital investment expenses for system extension and expansion. This is because, as previously noted, under the current legal framework the city buys and installs new assets before transferring administrative responsibility to the Vodokanal.[9] This circumstance is disadvantageous from a variety of perspectives. First, the current arrangement does not provide adequate resources for capital investment. The needs are significant. Developing and connecting one new well field alone, a Vodokanal priority, would cost an estimated 30 billion rubles (US$6.3 million). Available city revenues appear to fall far short of resource needs. Second, the arrangement is not conducive to setting tariff levels in the most economically efficient manner — setting prices equal to the marginal cost of providing for an additional unit of water consumption. Following the user pays principle, the marginal cost approach sends the correct price signal to use water efficiently. This approach is most appropriate where a utility is responsible for all aspects of service provision — systems operations and maintenance, renewal and replacement, and extension and expansion — and seeks to reflect the associated costs in its user charges. Third, the present system complicates capital investment programming, given the need to coordinate the planning of system renewal and replacement (a Vodokanal responsibility) with system extension and expansion (a city activity).

The second major item not currently identified as an expense is the carrying cost for large accounts receivable (i.e., amounts owed by customers to the Vodokanal).[10] This factor significantly affects the Vodokanal's revenues and overall fiscal soundness. These carrying costs

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[8] See *Recommendations on Planning, Accounting and Calculation of Self-Cost of Housing and Communal Services and Determining and Accounting for Tax and Profit*, Russian Federation Committee on Municipal Services, No. 3, January 20, 1993.

[9] In certain cases, the Vodokanal may require property developers to pay for extending lines.

[10] This amount currently (first quarter of 1996) represents approximately 40% of the annual operating expenses.

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have two adverse impacts. First is the lost opportunity cost of capital. If these monies were received earlier, they could be invested and earn a return until they were required. Second is the constant erosion of the value of the receiver's purchasing power due to inflation. For example, at the beginning of 1996, a debt of some 24,314,769,110 rubles had been outstanding for a year or more. In real terms, from January 1995 to January 1996 the value of this sum had declined by about 80%.[11]

Including those two new items in the Vodokanal's cost calculation would significantly raise the average price of water. To illustrate this impact, the team compared prices under three different scenarios, as follows.

- *Scenario 1* — Current calculation.
- *Scenario 2* — Current calculation plus two new cost items. Scenario 2 also assumed an aggressive campaign to collect delinquent payments, lowering delinquent accounts receivable to only 5% of total billing.
- *Scenario 3* — Current calculation plus two new cost items. With no new efforts to collect delinquent payments, bad debts were assumed to represent about 30% of total billing — approximately the current rate.[12]

The impact of including these two new items in the cost calculation is shown in Table 2.1. Assuming an aggressive campaign to collect delinquent payments (Scenario 2), the average price would rise by only about 20%, from 924 to 1,113 rubles per cubic meter. Without such a collection campaign (Scenario 3), the average price would rise much higher over the current level, by about 44% to 1,329 rubles per cubic meter. (The reduction in price between Scenarios 3 and 2, incidentally, illustrates the benefits that a crackdown on delinquent customers would yield for consumers who are used to settling their bills on time.) The final row on the table shows the total revenues generated under each scenario, including the 25% added "profit." The larger amount generated in Scenario 3 reflects the impact of its higher costs resulting from continued poor collection.

Regarding the cost accounting process: the Chief Accountant manually records expenditures, revenues received, bartered exchanges, and other transactions that affect the financial state of the Vodokanal. Much of the accounting system is not computerized. For this reason, additional personnel are required to carry out essential financial recording tasks, and then only in a modest

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[11] Estimate based on published inflation indices. Source: *Index of Manufacturing Prices for the Previous Month*, Division of Statistics, January 1996.

[12] Scenarios 2 and 3 would include capital investment costs following the cash needs approach of determining the costs of water service. This is one of the simplest approaches available. See Raftelis, George A., *Water and Wastewater Finance and Pricing*, 1993, pp. 143 ff. Scenarios 2 and 3 also both assume a loan of 30 billion rubles to pay for well field expansion and pumping system and main line connections, paid back over eight years at a 12% rate of interest.

All three scenarios take as their starting point the Vodokanal's cost calculations for January 1996. They also assume Vodokanal's monthly production figures of 4,150,000 cubic meters of water. Average price per cubic meter includes 25% added "profit."

degree of detail. For example, detailed depreciation schedules on all assets have not been carried out in several years. Although much of the financial and accounting work is done manually, it is comprehensive and accurate. Even the electrical expense for pumping water that is lost is recorded and included in the tariff structure.

Table 2.1
Impact of New Cost Items on Water Tariffs
(in 000 Rubles, unless noted otherwise)

Expenses	Scenario 1 (current)	Scenario 2	Scenario 3
Payroll	221,616	221,616	221,616
Chemicals	26,320	26,320	26,320
Electroenergy	678,947	678,947	678,947
Purchased water	278,263	278,263	278,263
Routine line operations	135,615	135,615	135,615
Shop operations	196,404	196,404	196,404
Depreciation	338,565	338,565	338,565
Capital repairs	750,000	750,000	750,000
Benefits and taxes	88,646	88,646	88,646
Water use tax	229,510	229,510	229,510
Overhead	123,111	123,111	123,111
Provision for bad debts	--	*144,000*	*864,000*
Capital investment	--	*482,800*	*482,800*
TOTAL[a]	3,066,997	3,693,797	4,413,797
Average price per cubic meter[b] (in Rubles)	**924**	**1,113**	**1,329**
Revenue each tariff would generate[c]	3,834,600	4,618,950	5,515,350

NOTES: All expenses represent monthly costs, based on Orenburg Vodokanal's 12/95 calculations.
[a] For assumptions on collection rates under different scenarios, see text.
[b] Based on Vodokanal's monthly production figures.
[c] Includes 25% "profit."

2.2 Setting Tariffs

2.2.1 Tariff Structure

A tariff can be expressed as the price per cubic meter of water consumed. A tariff structure reflects the tariffs paid by different customer groups. Such a structure should divide costs up among customers in an efficient and equitable manner, and satisfy other goals. To promote efficiency, two conditions should prevail. First, the customer classes used should group consumers according to their water use characteristics. Second, the tariffs applied should reflect the actual costs associated with serving each customer class.

The tariff structure that went into effect in January 1996, shown below, reflects neither of those two conditions of economic efficiency. The State-mandated customer categories used are applied across-the-board for all communal services. Thus, they are based more on an entity's role in the economy than on the particular characteristics of water demand. Enterprise/industry customers in particular may vary greatly in volume and pattern of water use, and thus not necessarily all belong appropriately to the same customer class. Finally, one notes that the decision to assign certain customers to particular classes is at times arbitrary, such as the decision to charge municipal budget organizations at the lower general population rates.

Table 2.2
Tariff per Customer Class as of January 1996

Customer Class	Tariff (Rubles/Cubic Meter)
General Population	370
Budget Organizations	924
Enterprise/Industry	2,691

Regarding rates: as shown, the tariff structure requires enterprise/industry customers to pay at levels more than seven times higher than those of the general population. This difference apparently does not reflect any difference in the actual costs of service, and, thus, is inefficient. Instead, rates are set according to State requirements and other considerations, probably including customers' perceived ability to pay. The tariff for budget enterprises reflects the Vodokanal's current calculation of the average cost of 924 rubles per cubic meter of water supplied (see Table 2.1). Following federal guidelines (discussed below), the rate for the general population was set at 40% of this average per unit cost. The rate for enterprise/industry customers was set so as to try to capture the remainder of costs.

Overall and in the long run, these price distortions act to hurt Russian citizens. Enterprise/industry customers are forced to cross-subsidize water use by other customers. This raises the cost of their goods, resulting in more expensive prices for consumers. Industries' competitiveness is reduced, which can lead to lower levels of production and higher unemployment. In other words, economic

decision-making is distorted — capital will not flow to its most efficient use. On the other hand, residential customers who buy subsidized water, where billing is not directly linked to consumption, face little incentive to repair leaking pipes or to conserve water, causing waste.

The federal government has taken actions to make water tariff structures more efficient and equitable. Decree No. 935 (September 1993, amended December 1995) set progressively higher levels of cost recovery for the general population. The tariff structure shown above conforms to this Decree by setting the residential rate at 40% of the average unit cost for water service — a relative increase from previous levels. The progressive implementation of this Decree should tend to equal out tariff levels among customer classes — a step toward greater efficiency.[13] This Decree also addressed equity: it promoted "safety-net" protection for lower-income families, by setting limits on the percentage of family income that should go toward housing and communal services.

2.2.2 Tariff-Setting Process

The city and oblast retain ultimate authority in setting tariffs. That process involves several steps. Vodokanal staff first develop a proposal for approval by the Vodokanal Director. The proposal is then reviewed by city departments and approved or rejected by the First Deputy Mayor. The Oblast Pricing Department must then approve the proposal. If necessary, oblast and Vodokanal officials may confer with the Deputy Mayor to reach a common position. The Orenburg City Mayor then provides final approval in the form of a Mayoral Decree.

The tariff-setting process may soon change somewhat. In December 1995, Orenburg Oblast passed a resolution that established a Commission to oversee the setting of prices for certain communal services, including water service. This Commission will be comprised exclusively of oblast officials appointed by the Oblast Governor: Directors of the Pricing and Antimonopoly Committees, and the Director of the Statistics Department.[14] The responsibilities of the new Commission are not formally spelled out in the Oblast resolution. The tariff approval process would be streamlined if this Commission were the only body to which the Vodokanal had to apply for increases in tariffs (see Chapter 5 recommendations). The Deputy Chairperson of this Commission has indicated that the Commission will consider automatic quarterly increases in tariffs based on the average increase in electric costs and increases in the costs of manufactured goods. The allowable increases will be stated in ranges for that quarter, and automatic increases within that range would be available to the vodokanals without going through the current tariff approval process.

While this change could help streamline the tariff-setting process, it neither furnishes consumer groups with any opportunity to formally comment on proposed rate increases nor buffers the

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[13] An even more efficient rate structure, however, would vary the unit price by customer class according to differences in costs associated with serving those different customers (e.g., cost differences resulting from geographic location, variability in water demands, etc.). See also Chapter 3 discussion.

[14] Orenburg Oblast, Resolution No. 979R, "Concerning the Establishment of a New System of Payments for Communal Housing and Services" (December 29, 1995).

tariff-setting process from political pressures from the city — one manifestation of the Vodokanal's lack of autonomy. The result: a lower likelihood that the tariff structure will be fair to customers in all categories, while at the same time providing for cost recovery.

2.3 Billing and Collecting

2.3.1 Determining Amount Owed

The most important way to increase cost recovery for water services is by improving billing and collection procedures. To increase efficiency, as well as to promote water conservation, customers should ideally be billed on the basis of water actually consumed. This is achieved via flow metering. However, only about one-quarter (23%) of the water now billed for in Orenburg reflected actual metered water use. For the majority of water consumed, cost is not tied to consumption. Nearly all consumers with functioning meters are in the enterprise/industry class, representing less than 1% of all customers. This is probably because their water use is more variable, as well as because they consume more water and their rates are set at higher levels than is the case for residential consumers.[15]

Non-metered customers, mostly residents and budget enterprises, are charged on the basis of water use "norms" set by the central government and ratified by the city.[16] Norms for the general population reflect building amenities (see Table 2.3).[17]

Based on the tariff structure and consumption estimates, officials calculate the amounts to bill from different customers.

2.3.2 Billing and Collection Procedures

The city and Vodokanal divide billing and collection responsibilities for different customer groups. From the perspective of Vodokanal autonomy, this division of responsibilities is not optimal. The city is charged with billing and collecting from about 90,400 apartments. Because it is not the primary service provider, the city faces few incentives to maximize collections. To collect for communal services, the city first distributes payment books to households prior to the beginning of the payment year. Residents then pay at either a local savings bank (Sberbank) or at the post office. Although those offices forward payments to the City Department of Housing and Communal Services bank account on a daily basis, the Vodokanal (as well as other communal service providers) only receives payments from that Department every month.

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[15] For further discussion of metering, see Chapter 4.

[16] See City of Orenburg Resolution No. 46R, dated January 19, 1994. This Resolution was based on Ministry of Housing and Communal Services Directive No. 658, dated December 24, 1981.

[17] For a discussion of the accuracy of these norms, see Chapter 4.

Table 2.3
General Population Norms for Water Consumption

General Population Customer Characteristics	Norm (liters/capita/day)
Consumption using street tap	35
Single home (water)	45
Detached home (water, gas)	70
Apartment, no bath (water, sewer)	100
Apartment, no bath (water, sewer, gas)	115
Apartment w/bath (water, sewer, solid fuel heaters)	135
Apartment w/bath (water, sewer, gas water heaters)	160
Apartment w/bath and several taps (water, sewer, rapid gas heaters)	170
Apartment w/bath (water, sewer, gas, hot water)	260[a]

NOTE: [a] Includes 140 liters of cold water and 120 liters of hot water.
Source: Orenburg Vodokanal.

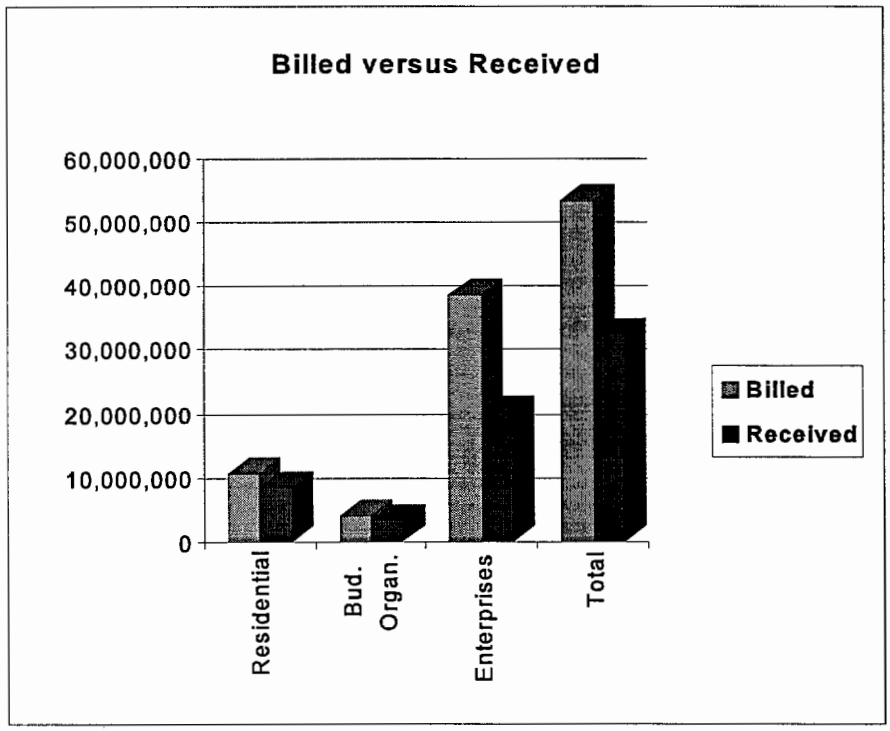
As a further hindrance to acceptable levels of cash inflow to the Vodokanal, the city often does not forward cash on to the Vodokanal but issues promissory notes (*vekseliya*). Some communal service providers (e.g., the heating network) reportedly enjoy a higher priority than the Vodokanal regarding cash payment receipts. To overcome this crippling lack of control over billing and collections from apartment buildings, Vodokanal officials have begun to investigate the costs and changes in procedures and personnel that would be required to take on these additional billing and collection responsibilities.

The Vodokanal also has a billing department. This department directly bills (i.e., without city intermediation) only the enterprise and budget organization accounts, as well as the 35,000 detached individual houses and several cooperative apartment buildings. These direct-bill customers may own single-family residences or apartment buildings. For example, the Vodokanal bills the industry Gazprom, which in turn collects from the residents of the buildings it owns via the zheks that maintain the buildings. Gazprom then places the receipts into its bank account and pays the Vodokanal when billed.

2.3.3 Collection Results

Figure 2.1 and Table 2.4 compare collections to billings on a month-by-month basis for 1995.[18] The figure and table show that, per month, total collections averaged only 61% of the total amount billed, an unsatisfactory performance. Looking at individual customer categories, one notes that the collection rate was lowest for enterprise/industry customers (53%). This is a particular concern considering, as shown, the high levels of revenues expected from that customer class (72% of total billings). Such a poor collection rate is undoubtedly caused in part by the "exorbitant" tariffs that the Vodokanal charges to enterprises, coupled with an across-the-board lack of serious collection enforcement practices. As large employers, enterprise/industries can, no doubt, bring considerable political pressure to bear on the city and the Vodokanal not to undertake aggressive collection efforts.

Figure 2.1
Tariff Collection — Billed versus Collected
(end of 1995; in 000s of rubles)



[18] Collections in excess of billings were treated as payments of accounts receivable from previous billing periods.

Table 2.4
Tariff Collection — Billed versus Collected

Customer Class	Billed (end of 1995; in 000s of rubles)	Percent of Total Billed	Received (end of 1995; in 000s of rubles)	Percent of Total Received
Residential	10,637,827	20	8,468,693	80
Budget Organization	4,068,513	8	3,445,529	85
Enterprise/Industry	38,509,037	72	20,420,595	53
TOTAL	53,215,377	100	32,334,819	61

Source: Orenburg Vodokanal Accounts Department; and PADCO, Inc.

Collection performance is actually far worse than as shown above. Only 27.9% of total "collections" were actual cash payments (see Table 2.5). The rest (72.1%) were non-cash payments, of three different types. Bartered good transactions (representing 43.6% of all "collections") were the most common form, followed by payments in notes (17.3% of collections) and debt-swaps (11.2% of collections).

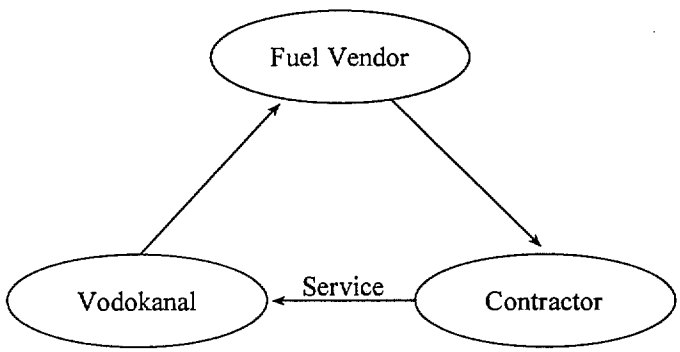
Table 2.5
Vodokanal Collections for 1995 (000 Rubles)

Customer Class	Cash	Non-Cash Payments			Total[b]
		Note[a]	Bartering of Goods	Bartering of Debt	
General Population	394,743	4,565,835	1,932,467	3,886,295	10,779,339
Budget Organizations and Enterprise/Industry[c]	10,395,058	2,123,537	14,885,880	425,658	27,830,133
Total by Type of Payment	10,789,801	6,689,372	16,818,347	4,311,953	38,609,473
% of Total	*27.9*	*17.3*	*43.6*	*11.2*	*100*

NOTES:
[a] Promissory notes from city and oblast, and treasury notes from federal government.
[b] Total differs from Figure 2.1, because this table treats advance payments as current payments.
[c] Data available did not permit breakdown of revenues from these two customer groups.
Source: City of Orenburg and Orenburg Vodokanal.

Bartering for goods and services may involve several parties. The Vodokanal may, for example, hire a contractor to complete a construction job (see Figure 2.2). Instead of paying the contractor directly in cash, the Vodokanal may reduce the sum owed for water services by a third party (the fuel vendor in the example). The fuel vendor is then, in turn, expected to reduce the amount owed for fuel by the contractor. Problems with bartering include the difficulty of exchanging goods and services of approximately equal values, and the additional transaction costs incurred from transporting, storing, and marketing bartered goods. Such an approach is inefficient and should be considered as only a last-resort option.

Figure 2.2
Bartering Practice at Work



Payment in notes (promissory notes from the city or oblast, treasury notes from the federal government) as opposed to cash represents a serious obstacle to the sustainable provision of water service. Most of these payments in notes — about 80% of the total face value — come from the City of Orenburg. In fact, over 90% of the monies that the city collects from the general population in cash are not transferred to the Vodokanal as cash, but instead are converted and transferred in the form of promissory notes (4,566 M rubles out of a total transferred of less than 5,000 M rubles for 1995). The oblast- and city-level notes have limited value. While they can be surrendered for payment of taxes and charges owed to city and oblast agencies, they cannot be widely endorsed or exchanged except to specific categories of legal entities. No secondary buyers' market exists for the notes. The notes deprive the Vodokanal of needed working capital, erode in value due to inflation, and are less transparent than cash transfers. This excessive use of promissory notes reflects in a very clear way the Vodokanal's crippling lack of autonomy from the city.

2.4 Enforcing Collections

The city and the Vodokanal currently have several enforcement mechanisms at their disposal to increase collections. However, these tools now receive at best very limited use. First, the City's Department of Housing and Communal Services has the authority to fine residential customers for late payment of communal services charges, including water bills. Late payments for services are

to accrue at a rate of 1% of the outstanding amount per day.[19] While these fines have been applied in a limited number of cases, the Vodokanal reportedly does not receive these revenues.

Other enforcement tools include court action against non-payers and service shut-offs. Cumbersome and costly court procedures discourage use of the first option. Service shut-offs may occur after three months of nonpayment.[20] The Vodokanal has undertaken some shut-offs for delinquent payments, but only of residents of single-family detached housing. A lack of meters and shut-off valves at the level of individual apartment units, and other design features of the distribution system, make it difficult to isolate and shut off other non-paying customers. This condition would make service shut-offs for many non-paying households politically unpopular and thus a less viable option.[21]

As in other areas, enforcing payments is complicated by the division of responsibilities between the city and the Vodokanal. While most of the incentives for increasing collections rest with the Vodokanal, the city administers much of the billing, collection, and enforcement system. The city additionally controls the payment records for most consumers, further complicating Vodokanal efforts to improve collections.

2.5 Some Financing Alternatives

Previous sections identified issues in revenue generation via non-finance water use charges. Two options for financing a metering program and/or capital investments are discussed briefly below.

2.5.1 World Bank Loans

If full cost recovery, tariff reforms, and metering are undertaken, the Orenburg Vodokanal's chances in competing for the World Bank Water and Sewer Infrastructure Loan would be enhanced. Metering at the whole building level would mark an excellent beginning to a program of comprehensive reform. The current World Bank loan to the city through the Enterprise Housing Divestiture Loan program of $68,000,000 could make the approximately $2.5 million necessary for metering at the building level available to the Vodokanal now. This would enable the Vodokanal to start immediately on the metering portion of the proposed changes (see Chapter 5 for recommendations).

2.5.2 Concessions, Build-Own-Operate, Build-Own-Operate-Transfer

If the collection rate can be improved and a payment guarantee established, and if the tariff regulation can be simplified or escalator clauses put into service contracts, private companies may be willing to provide water and wastewater services to the City of Orenburg. These service

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[19] Orenburg Oblast, Resolution No. 588R, dated August 10, 1995, "Regulations of Debts Owed by Consumers to the Providers of Housing and Communal Services," Section 2.5.

[20] *Ibid*, Section 5.1.3.

[21] One notes that service shut-offs have reportedly occurred in the City of Orsk, but only for enterprise/industry customers.

agreements often require companies to provide capital either for a new treatment plant, a treatment plant upgrade, or some other physical asset improvement.

The typical concession or service agreement to a private service provider lasts approximately 20-30 years, though some are longer.[22] Private companies bring with them the ability to apply private capital to the service being provided, and often bring very substantial management and technical research and development knowledge and experience to bear on service provision. However, such companies need to protect their financial soundness, and will undertake such a concession only if they can make a profit. Stated another way, the companies must be assured of payment for services provided, and/or have the ability to enforce collection of payment for services. Without these kinds of guarantees or rights, it is unlikely that Russian or international companies would undertake the provision of water service provision in Orenburg.[23, 24]

[22] The concession agreement for the Mexico City wastewater treatment project was for 50 years and involved at least four major international companies.

[23] The Public-Private Partnership Association Conference was held in Washington, DC on June 7, 1995. At that conference, General Electric Capital and representatives of the French and British international water and sewer service companies agreed that without guaranteed payments, or at least the guarantee of payment by the sovereign government, they would not be interested in seeking service contracts. One of the authors of this report was a speaker at that conference.

[24] A recent advertisement in a Moscow newspaper advertised a build-own-operate-transfer (BOOT) concession bid. While it is too early to tell if international companies are willing to participate in the bidding (bidders have until April 15, 1996 to submit bids), the announcement signals the city's interest in the BOOT approach. Of course, with Moscow being the capital of the Russian Federation, with the ability to access a sovereign guarantee, international interest in such a project may be enhanced. Nonetheless, if the project is carried out successfully, other large cities may want to evaluate the process given their specific needs.

Chapter 3
Economic Framework of the Project: Tariff Reform and Metering

This chapter seeks to identify the economic rationale and elaborate on the most essential economic findings of the project. To this end, the chapter has been divided into:

- a presentation of the basic principles and elements of economic reform in the provision of water;
- an evaluation of the benefits and costs of water sector reform;
- an analysis of the enterprise non-payment problem in the context of improving payment discipline on the part of end-users; and
- an approach to financing environmental infrastructure.

3.1 Basic Economic Principles of the Project

The City of Orenburg is facing the challenge of meeting the mounting costs of subsidies for communal services, in the context of growing energy prices and accelerating dilapidation of the city's environmental infrastructure. This task, however, becomes more and more difficult due to the virtually unlimited access of individual users to subsidized communal services. The existing tariff structure provides for unlimited, unaccounted-for subsidization of individual consumption of hot water by the city,[25] and requires enterprise/industries to cross-subsidize cold water consumption by residents. This cross-subsidy is grossly inefficient, and results in severe fiscal pressures on city and enterprise budgets. The efficiency loss caused by charging industrial consumers higher-than-marginal cost prices is exacerbated by uneconomic and at times wasteful consumption of water on the part of households. In the absence of rising block rates and caps on the amount of highly subsidized consumption of water, individual consumers are in essence given access to unlimited subsidies — the higher the volume of consumption, the larger the cross-subsidy required from enterprises or, in the case of hot water, from the city. To the extent that volume of household water consumption and enterprise tariff rates are positively correlated, the redistributing effect of the existing tariff structure may be thwarted by insurmountable efficiency losses. Thus, any reductions in household consumption of water at subsidized rates will translate into direct savings for both the Vodokanal and the city budget.

Ways need to be found to reduce cross-subsidies and increase cost recovery without hurting economically vulnerable social groups in the city.[26] Meeting such a challenge requires comprehensive reform. The demonstration project recently completed by PADCO/USAID in the City of Oren-

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[25] In effect, the city subsidizes the production costs of the local power plant (the Teploset) incurred either in heating the water for residential consumers or in buying the already heated water from external suppliers.

[26] During the project, there was some concern expressed that Article 426 of the Civil Code of the Russian Federation may further complicate the ability to pass the costs of water subsides for residential consumers to enterprises. However, "On State Regulation of Tariffs for Electrical Energy and Heat in the Russian Federation," No. 41-FL, 14 April 1995, permits utilities to establish different tariff categories for different users and appears to apply to all vodokanals as well.

burg provides several insights into the potential solution of this problem, and the major components of a comprehensive reform package, as discussed below.

3.1.1 Main Economic Rationale of the Project

The pilot project sought to develop an approach to the daunting task of reforming the provision of communal services in Russian cities. Although the pilot project has focused on the provision of water services, its findings are of no less significance for other communal services as well.[27] In theory, the task of reforming communal services in Russia can be defined as *the transition from the administrative rationing of consumption of water services to the economic rationing, or rationing by price*. Inherited from the socialist central planning system, the administrative rationing appears in the form of low levels of water services, in terms of both quantity and quality. Frequent outages of water and the poor quality of treatment are caused by a virtually unconstrained demand generated by heavily subsidized non-economic pricing, and lack of a credible payment enforcement policy in the provision of water services. The resultant shortage of capital for long-run expansions of the city's water systems and short-term maintenance and repairs makes it even harder for the city's water utility to provide an adequate level of service without resorting to physical rationing of demand. Thus, on the supply side, the transition to a market in the provision of water services in the City of Orenburg implies the implementation of full-cost pricing, metering of supplied water, and enforcement of payment discipline. On the demand side, the transition means re-establishing a broken link between the consumer's willingness and ability to pay on the one hand, and quality and quantity of services consumed on the other.

3.1.2 Reforming the Provision of Water Services on the Supply Side

Full-Cost Pricing and Metering — Inseparable Concepts

As has been described, metering is instrumental in approximating the consumption of water services by end-users, reducing system losses and the associated waste of energy and treatment, and, in general, making the provision of water services more efficient. However, *metering cannot achieve these objectives without being linked to an efficient structure of water tariffs*. It is of paramount importance that the latter should be related to the quantity of water services consumed. To illustrate the point, it is worth mentioning that in the 1960s, water metering was a widely accepted practice in the former Soviet Union. Many apartment buildings still retain remnants of broken or worn-out water meters. However, the crucial link between the quantity of consumption and its cost to the consumer has never been established. As was discussed in Chapter 1, existing billing procedures set a flat rate for households regardless of quantity of water consumed, which hardly provide any incentives for water conservation and leakage control.

Another reform component that should be noted is administrative reform. Metering combined with efficient economic pricing can achieve its purpose only if administered properly. If meters are not well-maintained and meters are not read regularly, tariffs based on metered consumption are

[27] Hereafter, we will refer to the provision of water services as an example of reform efforts in communal services.

unlikely to be effective, nor will metering yield benefits if charges, even if based on metering of actual consumption, are not collected.

Minimizing Production and Investment Costs of Natural Monopolies in the Water Sector

In an environment of very limited competition in the provision of water services, the implementation of metering and consumption-related water tariff reform should be accompanied by policy efforts to ensure that production and operation costs of the Vodokanal are minimized. Being a natural monopoly, the Vodokanal's investment and production costs should become subject to regulatory oversight by the city and the oblast. A failure to achieve transparency in the Vodokanal's accounting practices and control over its costs may have adverse implications for end-users and tax payers.

3.1.3 Reforming the Provision of Water Services on the Demand Side

To date, the situation on the demand side has been characterized by massive subsidization of residential consumers of hot water by the city and cold water by industrial users. Considerations of equity, which undoubtedly underlie the Russian tariff structure, influence tariff structures in many countries around the world. The unique feature of the Russian tariff structure, however, is that *it sets no limits on the quantity of individual consumption of water services that can be subsidized.* The conservation and equity effects of this policy are at best uncertain and at worst negative. Consider an example of two average-size families whose consumption of water remarkably differs: one consumes 220 liters of water a day, while the other uses 460 liters a day. A simple calculation suggests that the amount of consumer cross-subsidy received by the first household per month from enterprises equals 4,407 rubles, while the second household receives a subsidy of 9,215 rubles.[28] Despite a substantially higher subsidy received by the second household, the second household might have experienced serious, but nevertheless unattended, water leakages in the course of the month, and might have had an income higher than that of the first family.

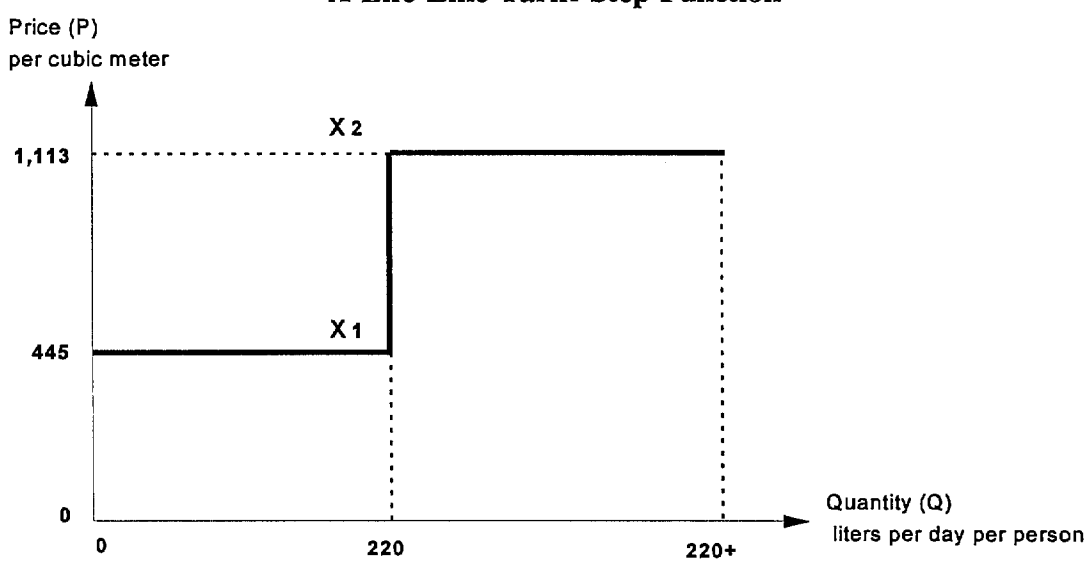
This "open-ended" structure of the existing subsidies creates major financial uncertainties, not only for enterprises, but also for the city, which subsidizes the production of hot water. In developing a new tariff structure, it is important to reduce the quantity of subsidized water to a certain level of consumption, and to extend this benefit perhaps only to low-income families. With these equity/efficiency preliminaries in mind, below we compare two alternative ways of incorporating the equity considerations in the structure of water tariffs: (a) a "life-line" tariff and (b) a normative subsidization under the auspices of the housing allowances program.

[28] The computation is based on the following assumption: The full marginal economic cost of producing one cubic meter of cold water equals 1,113 rubles, or the price of one cubic meter of water equals 1,113 rubles (see Water Pricing Scenario 2, Chapter 2).

A Life-Line Tariff

A two-tier water tariff is the first alternative solution to the existing inefficiencies and inequity in pricing of water. The residential tariff can be structured as follows. The first tier of the tariff, up to the so-called "life-line" level, would remain heavily subsidized (currently about 60%). However, the subsidized rate would apply only to that initial consumption block, which, for instance, can be set withing the limits of normative daily consumption in Orenburg for apartment buildings with individual water heaters (170 liters) and apartment buildings with centralized hot water supply (260 liters). A simple estimation yields a daily "life-line" block of subsidized consumption of 220 liters of hot and cold water per person a day. All consumption above this quantity would be charged at full marginal cost of producing the service. In theory, the initial subsidized level of consumption should be set in a way to attain the main health benefits of water use for all income groups, whereas a full marginal cost price for all individual consumption above the norm should give an incentive to limit water wastage arising from leaks, as well as to introduce economic considerations into individual consumption behavior. A heuristic example of a two-tiered "life-line" tariff is illustrated in Figure 3.1.

Figure 3.1
A Life-Line Tariff Step Function



As shown in the figure, a person consuming 220 liters or less water per day continues to enjoy a 60% subsidized rate of 445 rubles per cubic meter of water (denoted by X_1), whereas a person with the rate of consumption exceeding 220 liters is charged the full economic cost of water, i.e., 1,113 rubles per cubic meter for every liter over and above the proposed life-line normative. The major advantage of a two-tiered tariff system is that it does not require a universal tariff rate increase for residential consumers, which may be politically difficult to implement. Instead, it can be presented as a selective measure aimed at reducing the wasteful consumption of water by a few residential users. A system of water charges structured as a two-tiered tariff, however, should be decoupled from the bundle of other communal services currently covered by the program of housing allowances, which compensates low-income households for the part of their housing

expenses in excess of a certain portion of their income. A failure to separate water charges from other communal charges covered by a program of housing allowances may result in a double subsidization of water consumption: first through the subsidized block rate defined by the life-line, and second through the program of housing allowances.

Subsidization under the Auspices of the Housing Allowances Program

An alternative approach to a two-tiered system of effective and equitable water charges can be pursued under the auspices of the housing allowances program. In this case, water remains in the bundle of subsidized services covered by the program, and the city would have to implement a universal, almost 60% increase in water tariffs for all residential consumers. Low-income households can then be reimbursed through a housing allowances program for a part of the additional water-related expenditures caused by the price increase. As in the previous scenario, *metering and a life-line normative would be introduced to denote the quantity of household consumption of water services eligible for coverage through a housing allowance program.* This would encourage more economically frugal behavior on the part of residential consumers. Zheks are supposed to provide monthly reports to the housing subsidy offices regarding average consumption of water in the metered buildings. Compared to the above-described life-line tariff system, which, despite capping the quantity of subsidized consumption at a certain level, would still provide subsidies to all, this scheme makes water subsidies targeted only to low-income households. However, the major disadvantage of the scheme is in the political and legislative impediments to all sorts of tariff increases for residential consumers until the year 2003. In addition, in many instances, the program of housing allowances cannot be relied on due to its frequent underbudgeting and understaffing at the local level.

It is envisaged that the magnitude of economic benefits expected from reductions in household consumption of hot and cold water will considerably exceed the costs of metering and implementing a local tariff reform. Preliminary estimates of economic benefits from these policies are presented below. The computations weigh the costs of metering installation against the cumulative budgetary savings for the city and the Vodokanal.

3.2 Benefits and Costs of Metering and Tariff Reform

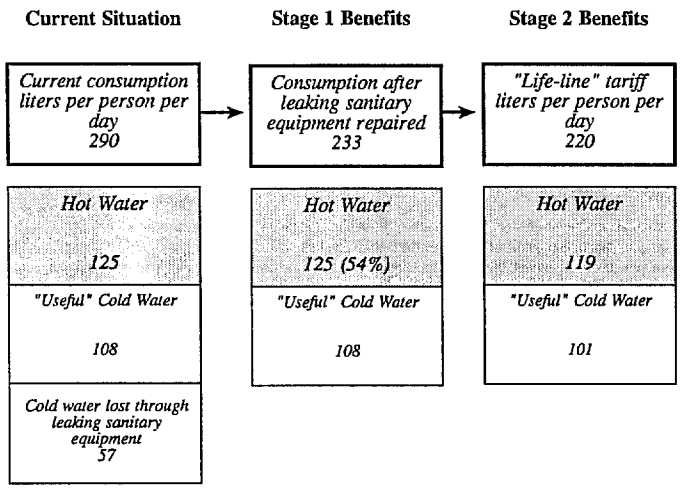
The benefits to be derived from introducing a life-line tariff and metering emerge in two stages, as follows:

- *Stage 1:* financial savings to be realized by the Vodokanal, and consequently enterprises, from capping the quantity of subsidized individual water consumption; and
- *Stage 2:* energy savings and, consequently, financial savings for the city and the Teploset (provider of heated water), to be obtained from reductions in individual consumption of hot water expected from tariff rate increases for water consumed above the "life-line" normative.

At the individual level, the water conservation benefits resulting from this two-stage impact are illustrated in Figure 3.2. In a hot-and-cold water apartment building, one individual, on average, may consume 290 liters of water per day. Capping the quantity of subsidized water consumption may cause residents to repair leaking equipment, reducing consumption to 232 liters/person/day

(Stage 1 benefits). Further water savings accrue through the imposition of higher rates for water consumed above the "life-line" norm (Stage 2 benefits), reducing consumption slightly to 220 liters/person/day.

Figure 3.2
Example of Benefits and Tariff Reform:
Individual Daily Consumption in Hot-and-Cold Water Apartment Building



NOTE: For current situation assumptions, see Chapter 4. For other assumptions, see below.

For the Vodokanal as a whole, the two-stage benefits that would accrue from metering and tax reform are discussed below.

Capping Quantity of Subsidized Individual Water Consumption

In the first case, the annual financial benefits (B) from introducing metering and a new system of water charges can be computed as:

$$(1) \qquad B = \sum_{n=1}^{3} 365(X_n - Y)kRP_n$$

where:

X_n = the estimated current individual consumption of water in each group of individual users
Y = a suggested "life-line" universal consumption normative (for the purposes of this calculation, it is set at 220 liters per person)
R = marginal economic cost of producing one cubic meter of water, set at 1,113 rubles
k = a subsidy coefficient, set at 0.6, i.e., 60% of the marginal economic cost
P_n = number of individual users in each individual consumption group
n = number of individual water consumption groups in the city

Table 3.1 provides the figures on the total number of individual consumers in each user group (based on the City Communal Services statistics), project-based estimates of individual consump-

tion of water in each user group, and expected subsidy savings. Estimated total annual savings from the expected reduction in subsidized individual consumption of water is 5.12 billion rubles.

Table 3.1
Expected Annual Subsidy Savings from a Proposed Tariff Reform

User Group Code[a]	1	2&3	*Total*
Individual Consumption (liters/day)[b]	260	290	*NA*
Number of Users	91,000	248,104	*339,104*
Expected Annual Subsidy Savings (billions of rubles)[c]	0.89	4.23	*5.12*

NOTES:
[a] User Group Codes represent users in the following types of buildings:
1 Apartment buildings without hot water, but with running water and individual water heaters
2&3 Apartment buildings with centrally heated hot water
[b] The numbers represent estimates of the average actual consumption of water by individual users in each user group, and are roughly comparable to Table 4.4.
[c] The estimates of Expected Subsidy Savings were obtained from equation (I).

Imposing Higher Tariffs for Water Consumed above "Life-Line" Normative

The computation of energy savings due to imposing higher tariff levels above the "life-line" normative is more complicated. As in the case of water services, residential users receive a 60% subsidy for each KWH of energy, regardless of the quantity consumed. Thus, the amount of financial savings for the Teploset (and, eventually, the city budget) will be determined by the amount of energy savings from the reduced individual consumption of hot water by individual users. For every liter of hot water saved by residential users, the city would save up to 60% of marginal costs of heating one liter of water — the current production subsidy to the Teploset.

The expected reduction, in turn, is contingent on the price elasticity of demand for individual consumers. To compute the consumers' response to a life-line tariff and metering, we assumed a range of price-elasticities varying from -0.2 to -0.5.[29] This range of price-elasticity estimates seems to be the most common (Linn, 1994). Then, under the proposed tariff policy, it is expected that consumers would adjust their consumption of hot water to accommodate the expected price increase. Mathematically, the expected reduction ΔQ in the individual consumption of water is given by equation (II):

[29] Price-elasticity of demand for water is defined as the degree of responsiveness of water demand to changes in user charges, i.e., a percentage change in consumption in response to 1% increase in price.

$$(II) \qquad \eta_n = \Delta Q_n / \Delta P = \frac{\frac{Q_2 - Q_1}{Q_1}}{\frac{P_2 - P_1}{P_1}}$$

where:

(η)	=	price elasticity of demand
Q_1	=	current level of hot water consumption
Q_2	=	expected level of hot water consumption once a line-life tariff is in place
P_1	=	current price paid by individual users
P_2	=	expected price to be paid by individual end-users

Table 3.2 presents the expected reductions in the individual consumption of hot water by all users under different assumptions about price elasticities of demand. In addition, the table contains the estimates of expected monetary savings from a reduced consumption of hot water.

Table 3.2
Expected Annual Monetary Savings Reduction in the Individual Consumption of Hot Water under Different Price Elasticities (billions of rubles)

User Group Code[a]	2&3			
Price Elasticities	-0.2	-0.3	-0.4	-0.5
Expected Reduction in Individual Consumption (liters)[b]	3.12	4.16	5.20	6.24
Monetary Savings[c]	0.60	0.80	1.00	1.20

NOTES:

[a] In this table, we have combined both Type 2 and Type 3 groups of residential consumers of hot water into one group. The total number of consumers in these groups equals 248,104.

[b] The expected reduction in the individual consumption of hot water was computed using equation (II). The computation assumes that, responding to higher prices for every liter of water consumed above the norm, individual users will reduce their consumption right away, as opposed to waiting until the last liter of subsidized water is used up. The current total individual consumption of water was assumed to be equal 290 liters a day, where 57 liters represents loss of cold water through the leaking sanitary equipment. After sanitary equipment is fixed the consumption will drop down to mere 233 liters, of which 54% (125 liters) is hot water (see Table 4.5). Individual users are assumed to pay the full economic cost of water — 1,113 rubles per cubic meter (see Chapter 2, Pricing Scenario 2) — for every liter consumed above the 220 liter normative. As of January 1, 1996 the current price paid by individual consumers equals 370 rubles per cubic meter.

[c] The amount of annual monetary savings (S) from the reductions in the individual consumption of water was computed as follows:

$$(III) \qquad S = 365 Q_n P_n \frac{M_p}{30} (1 - L)$$

where:

Q_n = Daily absolute reduction in the individual consumption of hot water in (liters)

P_n = Number of individual users in a user group (248,104)

M_p = Monthly payment for hot water, rubles per person (information received from Orenburg municipal computer center — 5,100)

L = Portion of the full marginal cost of communal services paid by residences (40%)

Finally, Figure 3.3 summarizes the cumulative monetary savings from the reduction in the quantity of subsidized individual consumption of water and energy under different price elasticities. As shown, the expected annual subsidy savings from the reduced individual consumption of hot water in Orenburg may be as high as 0.60 billion under a price elasticity of -0.2, and could reach 1.20 billion rubles under a price elasticity of -0.5.[30]

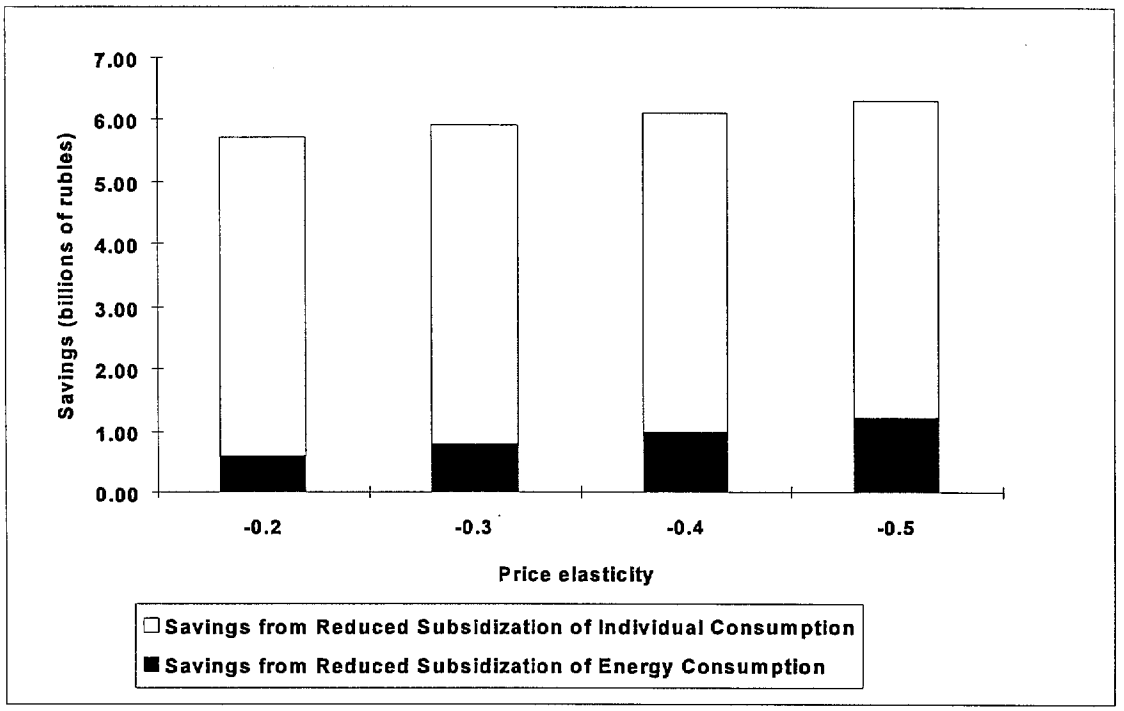
Finally, Figure 3.3 summarizes the cumulative monetary savings from the reduction in the quantity of subsidized individual consumption of water and energy under different price elasticities.

The implementation of metering and tariff reform thus appears to offer a very favorable investment opportunity for the city, as the construction costs of the program (estimated at 9.12 billion rubles) can be recovered in about 3.5 years.[31] It is envisaged that the city would realize savings from reduced energy subsidies. If combined, the overall economic benefits of the program are estimated in the range of 5.72 to 6.32 billion rubles per year.

[30] Under the current exchange rate of 5,130 rubles per U.S. dollar, the estimated savings will equal US$0.1-0.3 million per year.

[31] Estimate of cost is for city-wide meter installation in apartment buildings, at building (as opposed to apartment) level. Refitting old pipes would cost an additional estimated US$300,000. Calculation of loan repayment assumes a 12% loan for the total amount required.

Figure 3.3
Annual Subsidy Savings from Metering and Tariff Reforms



3.3 Addressing the Problem of Enterprise Non-Payments

As described in Chapter 2, non-payments for water services are endemic and spread throughout the city's economy. In 1995, the collection rate was the lowest — about 52% — for enterprises. As of November 1, 1995, enterprise water bills stood at almost 20.5 billion rubles. Confronted with a problem of deep enterprise arrears, the Vodokanal had no choice but to pass through this accounts receivable to its suppliers — mainly the local power plant (Teploset) and construction companies. By the end of 1995, the Vodokanal's debt to suppliers was roughly equal the amount owed to it by enterprise users and budget organizations. Under these circumstances, new, creative solutions should be sought to address the Vodokanal's enterprise non-payment problems.[32]

3.3.1 Enforcement of Payment Discipline among Enterprise Users

Currently, the enforcement of payment discipline in the enterprise sector is severely impaired by the magnitude of the non-payment problem. In this environment, the use of sanctions, such as bankruptcy court procedures against indebted enterprises, appears to be highly problematic. Unless the number of indebted enterprises is substantially reduced, the ability of the Vodokanal

[32] It is important to emphasize that the same solution can apply to the current non-payment problems faced by the Orenburg municipal power plant (Teploset). The "unbundling" of enterprise debts to Teploset can bring a serious relief to the city budget, and will result in the improved quality of maintenance and operation of the power plant itself.

to improve its collection rate through sanctions will be inherently limited. Below, we develop an approach that addresses enterprise indebtedness for water services.

The suggested approach is based on a clear distinction between two types of enterprise debts: indebtedness caused by temporarily enterprise liquidity problems, and indebtedness due to enterprise structural problems. In the former case, a financially healthy enterprise confronts a *short-term* shortage of cash or other liquid assets to finance its immediate liabilities, but, once the crisis is resolved, can easily repay its debts from a future cash flow. In the latter case, however, the enterprise indebtedness is attributed to a whole spectrum of serious *long-term* structural problems that in one way or another are indicative of the enterprise's poor financial health and perhaps of an upcoming bankruptcy. The separation of enterprises into two groups of debtors is important, as it allows the generation of collection policies that best fit the given enterprises. The indebtedness of financially healthy, but nevertheless temporary illiquid enterprises, can be addressed by means of financial instruments, such as promissory notes or other short-term corporate debt instruments that will ensure mutual payment of debts between trading partners and enterprises. In the case of structurally financially insolvent enterprises, a range of payment enforcement mechanisms, including the shut-off of services and bankruptcy courts sanctions, should be put in place to enforce the payment discipline. The rest of this chapter, however, focuses on the means of addressing non-payment of debts for the first class of enterprises, i.e., enterprises with temporary liquidity problems.

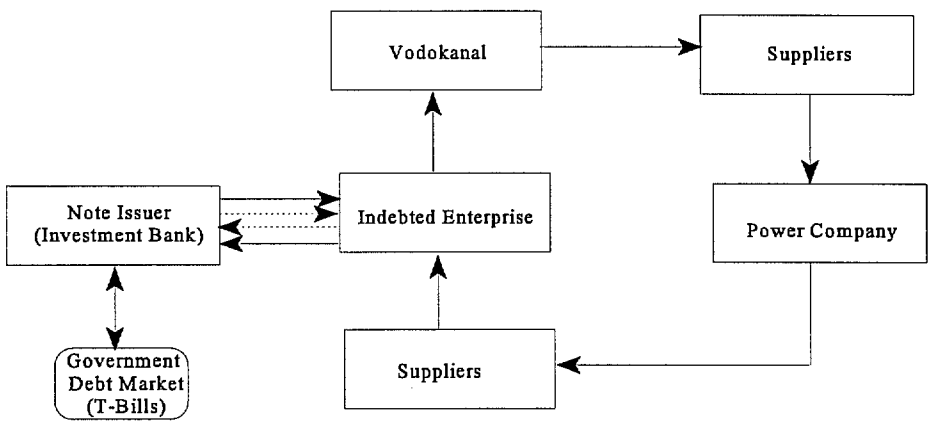
3.3.2 Promissory Notes: On the Way to the Russian Repo Market

In the last several years in Russia, a market for promissory notes, which are in essence short-term liquid debt instruments collaterized by the Russian Treasury Bills, has developed. Promissory notes enable an enterprise to meet its liabilities by providing it with liquidity. They work as follows. The enterprise short of cash buys at a discount the dealer's promissory notes backed by Treasury securities held in a customer's money market account. The dealer agrees to buy the notes back at face value at maturity. The discount is slightly lower than the discount on Treasury bills (T-bills) of the same maturity. The difference between the discount rate on T-bills and the discount rate on the dealer's promissory notes constitutes the dealers commission for providing the enterprise up front with a liquid debt instrument that can be used as a means of payment at its face value. Essentially, by trading cash for a highly liquid promissory note at a discount, the enterprise receives a loan amounting to the size of discount and secured by T-bonds. If, for instance, the enterprise acquires a promissory note with a face value of US$100 at US$70 and then uses it to offset its indebtedness to a supplier in the amount of US$100, the size of the loan amounts to US$30 with US$70, dollars invested by the dealer in the government debt maturing on the same date as the promissory note. The Russian promissory notes are in many respects reminiscent of the U.S. repurchase agreements, which are a traditional source of short-term liquidity for U.S. companies.

Now consider how promissory notes can help address the problem of enterprise debts to the Orenburg Vodokanal. Figure 3.4 presents a flow of funds diagram for unbundling corporate debts in the municipal sector. This scheme has already been successfully applied in the energy sector in Russia. Under this scheme, the Vodokanal would agree to accept promissory notes issued by

a creditworthy issuer toward offsetting the enterprise's debts for water services. Similar to the first enterprise, the Vodokanal would use a promissory note to make a payment to a supplier, say the local power company, Teploset, which, in turn, will pass the note to its suppliers.[33] The note then returns back to the indebted enterprise (which acquired the note in the first place). At a maturity date, the note is presented for payment to the issuer, which would buy it back at face value by liquidating the enterprise's holding of the government Treasury bills.

Figure 3.4
Unbundling Enterprise Debts to the Vodokanal



The transaction enables indebted but otherwise financially solvent enterprises to make payments to suppliers, thus triggering a whole chain of mutual corporate debt payments. What is also important is that the scheme introduces financial discipline into the sector and encourages economic agents to respect financial contracts. It is worth mentioning, however, that at present with no enforcement procedures in place, there is little incentive for an enterprise to purchase these notes, as it is easier to default on its payment obligations. The development of an effective legal framework capable of allowing enforcement of financial contracts is crucial for making financial instruments work.

In the case of municipal- or government-owned enterprises, the problem of non-payments can be addressed through the conversion of enterprise "water" debts into municipal or federal tax credits. The Vodokanal will then apply these credits toward enterprise debt reduction. As mentioned, in the past, the Vodokanal has already used municipal tax credits toward offsetting debts of municipal enterprises. However, decisions at the local and federal level should be made to turn enterprise debt-to-tax-credit conversions into a more transparent and easy-to-implement process. In addition, regulations should be enacted by the Central Bank and Ministry of Finance to bring the issuance of municipal and corporate promissory notes in line with robust financial practices.

[33] It is obvious that the role of the note issuer in building circuits of transactions that would use promissory notes in lieu of cash is critical in making the transactions possible. Equally important is the need to ensure that there is an effective regulatory framework in place to ensure the financial viability of the note issuer.

In sum, to reduce a non-payment problem, a number of transparent and strictly-adhered-to payment enforcement and payment facilitation mechanisms should be put in place. These may include a wide range of monetary fines, legal sanctions, enterprise debt-to-equity conversions in the case of accruing arrears,[34] physical shut-offs of the service, as well as financial instruments. A detailed operational code of collection enforcement practices should be prepared and submitted for an endorsement to the appropriate government bodies.

3.4 Financing Environmental Infrastructure Investments

In the past, upgrading and capacity extension costs were paid for by government capital grants. As a result, as shown in Chapter 2, capital costs of investment are not reflected in the existing tariff structure. As federal transfers for environmental infrastructure have ceased to exist, new source of funding have yet to be found. In addition, the lack of transparency and financial accountability for the use of tariff proceeds results in the diversion of capital replacement funds to alternative uses, causing frequent breaks of the system and apparent deterioration of service. In these circumstances, the project has developed the concept of a Regional Environmental Infrastructure Trust (REIT), aimed at becoming a major vehicle of financing water and sanitation infrastructure in the oblast. A discussion of the REIT is presented below.

3.4.1 Objectives

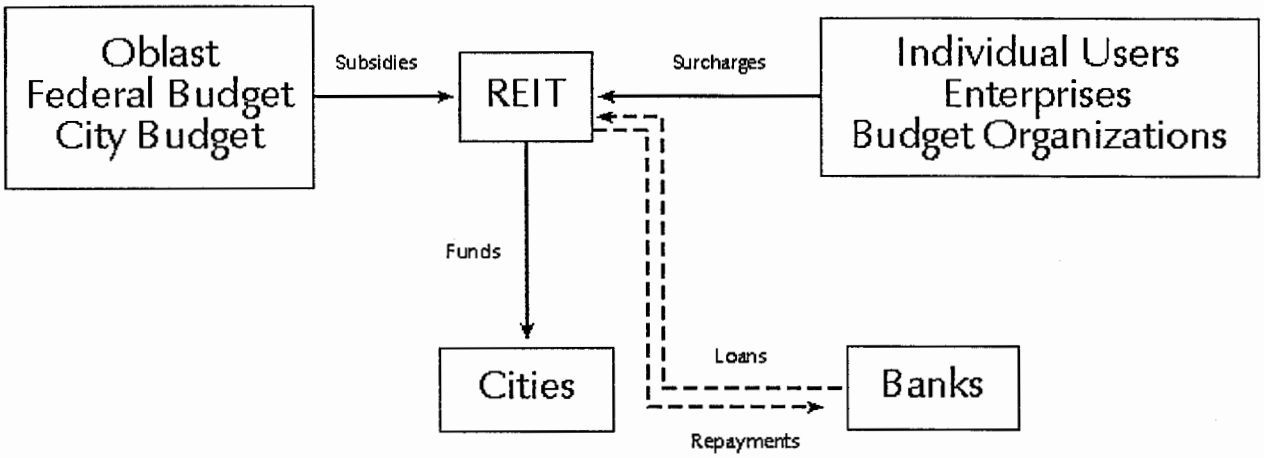
The proposed REIT will be created for the primary purpose of achieving more transparency and accountability in the allocation of funds earmarked for expansions or major upgrading of water and sanitation infrastructure in the Orenburg oblast. The Trust will use the proceeds from user charges, grants from the federal budget and the oblast administration, and, possibly, in the future, loans from banks to fund capital improvements of environmental infrastructure in selected cities. A city's allocation from the REIT will be based on the size of the city's annual contributions, its ability to demonstrate the economic viability of investment, as well as its positive impacts on the local environment and health of the population. In addition, participation in the REIT program will be dependent on the ability of a city to demonstrate tangible results in achieving cost recovery, transparency, and equity in the provision of municipal services. It is envisaged that, as the only source of funds for environmental infrastructure in the oblast and in the country, the REIT can provide a strong incentive for introducing financial discipline into the sector, and eventually will result in substantial improvements in the quality and cost-effectiveness of water and sanitation services in the Orenburg oblast. In the future, the REIT may become an ideal vehicle for raising long-term capital in the international and domestic capital markets for water and sanitation facilities in the oblast.

The structure of the REIT is shown in Figure 3.5. It will raise funds from individual end-users, enterprises, budget organizations, central government grants, and allocations from the oblast budget, as well as through loans from domestic and international lenders. Using the guidelines developed by the Trust shareholders, the REIT will allocate funds to utilities in qualified cities. The REIT will supervise the disbursements and will be accountable for the use of disbursed funds

[34] By accumulating 30% of the debt of an enterprise, Russian law provides for forced conversion of debt to company stock.

before the cities-shareholders and the Orenburg oblast administration. The Trust will be subject to an annual independent audit, the results of which will be available to the public on request.

Figure 3.5
Regional Environmental Infrastructure Trust



Each city — a member of the Trust — will have a separate account with the REIT and will receive monthly balance statements certified by an independent auditor. In order to leverage federal and oblast grants and to provide positive incentives for cities to implement the proposed reforms, funds will become available first to those cities that can demonstrate substantial progress in achieving full cost-recovery and transparency in the provision of municipal services. It is worth emphasizing, however, that any city participating in the REIT scheme will be entitled to the level of assistance in the amount that equals at least the net present value of its total user-fee contributions to the Trust over the time of the membership, regardless of the performance.[35] The importance of the REIT scheme can be summarized by highlighting the following advantages.

- The scheme will introduce transparency, accountability, and better financial control over the use of proceeds from user fees earmarked for new capital construction and major upgrades of environmental infrastructure.
- Requiring cities to constantly deposit the proceeds from a capital construction user fee to an REIT account will result in a sufficient pool of resources for expansions and upgrading of the environmental infrastructure in the oblast and thus in a better quality of municipal services.
- By introducing the time sequencing criteria in terms of making funds available to cities with the best record in reforming municipal services, the REIT will promote the reform of municipal services in the oblast. In turn, this may result in substantial subsidy savings for the oblast and city budgets.
- Over time, the REIT may become an ideal vehicle for raising capital for the oblast infrastructure in the domestic and international capital markets.

[35] The discount rate should be set equal to the average return on the portfolio of government and corporate debt held by the Trust.

3.4.2 Structure

Organization. The REIT will be an official government entity charged with providing funds to city utilities for major upgrades and capital expansions. The Fund will be administered by the Board of Shareholders that would consist of cities and the representative of the oblast administration. These guidelines will be reviewed annually. All financial activities of the Trust will be supervised by the Board of Trustees, which will include representatives of vodokanals, of administrations in participating cities, of the Regional Administration, and of the Ministry of Construction. The activities of the Fund will be subject to an annual government audit.

Operation. The Board of Trustees will have to develop a system for prioritizing beneficiaries and allocating funds under the program. A point system can be used to prioritize potential beneficiaries. It is important that the design of the point system be equitable, understandable, and relatively easy to administer so that the participating cities and end-users will have confidence in the REIT program.

The point system will serve the dual purposes of encouraging conformity with the goals of financial reforms in the provision of municipal services and queuing up potential beneficiaries. Queuing is necessary because there will be — at least at the beginning — more need for resources than the program can accommodate. At the later stages, this liquidity problem can be overcome by borrowing against the cash flow of user fees. Cities high in the point system must accumulate a sufficient amount of funds in their Trust deposit and demonstrate progress in their efforts to introduce financial discipline into the sector.

In addition to a point system, a system for enforcing the REIT guidelines should be put in place. Cities that show inconsistency in making their scheduled monthly contributions to the REIT or that loosen up their reform efforts should be penalized through monetary fines and/or termination of the membership.

Financial Management. Each city participating in the scheme will have its own account with the Trust. Financial assets of the Trust will be invested in highly liquid, low-risk government and corporate debt instruments and will be managed by a licensed investment advisor (IA) — either a commercial bank or a financial company with an established track record. Acting as payment agent, the IA will also be responsible for making disbursements to the cities and controlling the use of funds. The IA will report monthly to the Board of Trustees on account balances, as well as on the payments made, and on the use of disbursed funds by the cities.

3.4.3 Sources of Funds

The REIT will obtain its funds from a capital construction user surcharge added to the base tariff for all groups of end-users. In addition, the oblast administration and participating cities may contribute some budgetary resources to sustain the operation of the REIT. Once collected at the city level, payments from end-users in participating cities can be channeled directly to the corresponding accounts in the Trust. All funds provided from budgetary sources will be deposited

in a special budgetary account. Payments from this account will be made to cities high in the point system to boost their account balances.

3.4.4 The Role of Promissory Notes in the Financial Management of the Trust

It is envisaged that the financial management of the Trust will rely heavily on the use of promissory notes. Besides offering a solution to the problem of enterprise short-term liquidity, as described in Section 3.3.2, promissory notes can play an important role in improving financial discipline in the municipal services sector. In essence, promissory notes represent a means of payment limited only to certain transactions agreed on by the Trust members and participants of the promissory note scheme. However, the constrained liquidity characteristic of promissory notes makes them even more suitable for the financial management of the Trust. It works as follows. Trust members' cash contribution to the REIT gets immediately converted into the Trust shares redeemable only for corporate promissory notes. Should cities decide to pull out of the REIT at their earliest convenience and cash in their monetary contribution, all they can receive would be promissory notes redeemable for cash on a certain maturity date. Prior to maturity, however, the use of promissory notes as a means of payment would be restricted to infrastructure type of investments. Thus, on the one hand, the scheme provides very little incentive for the cities to breach their financial contracts with the Trust before the maturity of promissory notes. On the other hand, the use of promissory notes as a means of payment would facilitate a more transparent and easier-to-control allocation process of the cities' contributions to the Trust. Earmarked only for infrastructure-related investments, the use of promissory notes will considerably reduce the possibility of funds' misallocations in the disbursement process.

Chapter 4
Water Metering Demonstration Activity

As part of the present assignment, USAID/PADCO conducted a water metering demonstration activity in Orenburg. It is anticipated that the meter reading will be continued by the Vodokanal after the closing of the field office. Below, we present: 1) objectives of the exercise, 2) background on water metering and housing stock in Orenburg, 3) study design and meter installation, 4) preliminary results, and 5) preliminary conclusions.

4.1 Study Objectives

As noted earlier, many regard water flow metering as a key condition in providing financially sustainable water service. Only through metering can billing for water use be related to actual water consumption. This is essential for allowing the price of water to signal to consumers the commodity's relative scarcity and value, permitting supply and demand to equilibriate. Metering can also yield other information of value to water system administrators (e.g., data regarding water loss). However, under the former Soviet Union, water metering at the apartment level was not widespread. This condition continues to prevail today.

By installing meters and tracking results in a few selected apartment buildings in Orenburg, this study sought to evaluate the technical and financial feasibility of water metering for general population customers in the city. By demonstrating where water metering can be effective, the exercise sought to "prime the pump" for more widespread water metering of residential customers in Russia.

4.2 Aspects of Building Stock and Metering

4.2.1 Housing Stock

Of the three major classes of communal service customer, the general population's water use is the least metered. At the beginning of the study in Orenburg, none of the municipal apartment buildings and few individual homes were metered. (Water meters are now required on new single-family residences.) By contrast, virtually all enterprise/industries that the Vodokanal sells water to were metered, as were a small proportion (5%) of budget organizations. Residences are metered less, probably in part because households' water use tends to be more predictable and at lower levels than industries. These factors, coupled with the provision of water to residents nearly free of charge under the Soviet system, and at heavily subsidized rates in recent years, has undoubtedly rendered the metering of residents' water use less cost-effective than for other customers up to the present.

Seventy-eight percent of dwelling units are found in apartments buildings rather than in single-family houses (see Table 4.1). Apartment units are found in several major building types. Type 1 buildings, representing 27% of apartment units, offer cold water service only. Types 2 and 3 buildings offer both hot and cold water; together they make up around three-quarters (73%) of total apartmental housing stock. Type 3 buildings feature hot water that circulates to the heating substation. Those buildings are twice as prevalent as Type 2 structures, where hot water does not

circulate. Housing stock varies in age from very old to recent construction. Of the three types of apartment buildings, Type 1 buildings (cold water only) are generally older and house fewer people than buildings of Types 2 and 3 (cold and hot water).

Table 4.1
Orenburg Housing Stock Served by the Vodokanal

Type of Housing	Number of Buildings	Number of Units	Est. Number of Residents	% of Total Units
Apartments	2,206	121,835	339,104	78
Detached Single-Family	35,000 (est)	35,000 (est)	98,000	22
TOTAL	37,206 (est)	156,835 (est)	437,104	100

Types of Apartments By Type of Water Service	Number of Buildings	Number of Apartments	Number of Residents	% of Apartments
Type 1: Cold Water	--	32,500	91,000	27
Type 2: Cold and Hot Water (noncirculating)	--	26,799	75,037	22
Type 3: Cold and Hot Water (circulating)	--	62,536	173,067	51
TOTAL	2,206	121,835 (est.)	339,104	100

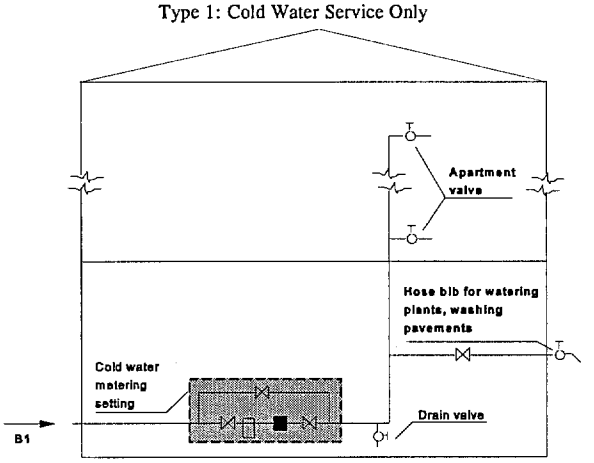
Source: Interviews with Gazprom, City Housing Department, and Vodokanal Billing Department.

4.2.2 Metering at the Whole Building Level

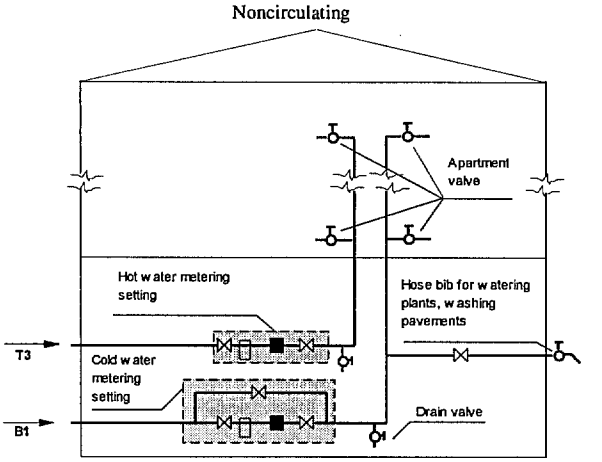
Schematic diagrams of apartment building Types 1, 2, and 3 are shown in Figure 4.1. These categories feature one, two, and three water connections at the whole building level, respectively. Each of those connections would need to be metered when measuring water consumption at the building level.

Figure 4.1

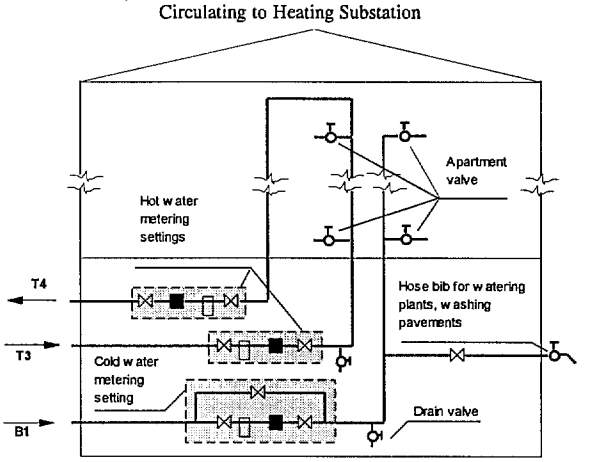
Type 1: Cold Water Service Only



Type 2: Hot Water and Cold Water with Hot Water Noncirculating



Type 3: Hot and Cold Water with Hot Water Circulating to Heating Substation

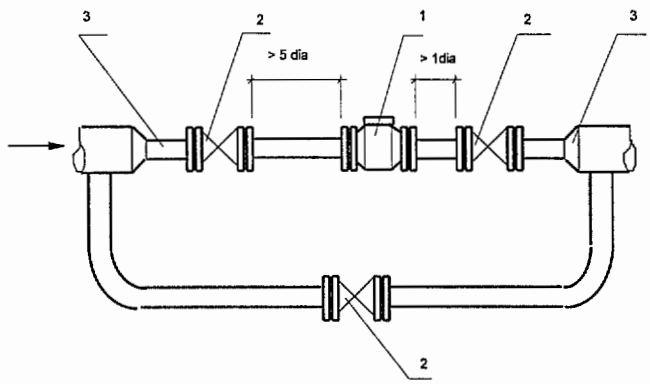


LEGEND

⋈	Gate valve	B1	Cold water supply pipe
		T3	Hot water supply pipe
■	Water meter	T4	Hot water return pipe
		T1	Hydronic heating supply pipe
	Strainer	T2	Hydronic heating return pipe

Meters would be installed in utility piping and equipment areas found in the basements of the apartment buildings. A typical cold meter installation is shown in Figure 4.2. Basement design would often make the construction, installation, and reading of meter assemblies difficult; this obstacle could, however, be partly addressed by remote read-outs. The typical concrete-walled basement consists of rectangular rooms 4-6 meters per side that run the length of the building. Openings between rooms are very small, requiring one to stoop to enter or turn sideways to pass through. Floors are of dirt and may be wet and muddy due to leaking pipes and seepage of water through the foundations. Ceiling heights can vary from slightly less to slightly more than two meters.

Figure 4.2
Typical Cold Water Meter Installation

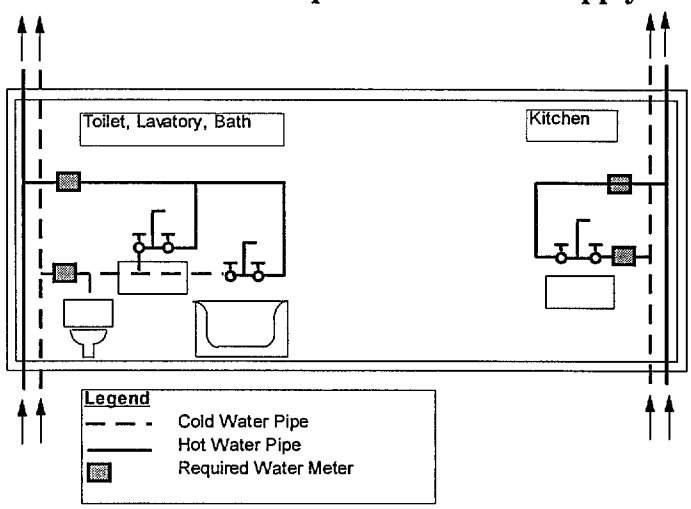


LEGEND:
1. Water Meter
2. Gate Valve and Bypass Line
3. Connecting-transition Pipe

4.2.3 Metering at the Apartment Level

Metering would become much more costly at the level of individual apartments. Metering of apartments would require both installing new meters, as well as, in many instances, replumbing. The number of water connections — and, hence, the number of flow meters that would be necessary — varies from one (cold water only) to four. A typical example of the last situation is a larger apartment provided with two hot water pipes and two cold water pipes (see Figure 4.3).

Figure 4.3
Typical Three-Plus Room Apartment Water Supply Diagram



4.3 Aspects of Study Design and Implementation

To realize the study objectives given current conditions in Orenburg, the study was designed as follows.

4.3.1 Focus of Exercise

In consultation with Vodokanal officials, the team decided to meter water use at the building level, rather than the individual apartment level. Given the costs and difficulties of metering individual apartments as suggested above, it was assumed that metering at the building level would likely be more cost-effective. It would also represent a logical first step toward eventually metering individual household consumption.

4.3.2 Building Selection

With help from Vodokanal and City Housing and Communal Services Department staff, the team inspected about 30 buildings for meter installation. About half of the buildings reviewed were rejected because they contained commercial areas. Others were rejected because installing meters would require excessive levels of replumbing due to the inadequate spacing or pipe configuration. Eight buildings were finally selected for metering, some of which had existing cold water meter elements (see Table 4.2). The eight buildings selected represented all three apartment types, in roughly the proportion found in Orenburg: four buildings of Type 3, one building of Type 2, and three buildings of Type 1. The selected buildings are also geographically dispersed, so as not to overemphasize any problems that may be endemic to a particular part of the city.

Table 4.2
Buildings Selected for Metering

#	Address	Type (see Figure 4.1)	# of apartments	# of tenants
1	Amurskaya, 2/1	2	80	71
2	Znamenskikh, 11	1	80	191
3	Znamenskikh, 9	1	80	176
4	Turkestanskaya, 4b	1	40	69
5	Tsentralnaya, 3/1	3	60	190
6	Tereshkovoy, 10	3	108	320
7	Chkalova, 57/1	3	240	790
8	Gagarina str., 33	3	60	164
	Total		**748**	**1971**

4.3.3 Data Gathering

Data was gathered primarily using flow meters, purchased and installed locally. The contractor for this task was selected competitively, based on price and experience.

The team decided to collect several types of data. First, cost data were collected based on engineering estimates and from contractors. Second, the team read flow meters daily, and recorded date, time, and consumption information on special forms (see Figure 4.4). All meters in one building were read at the same time. Third, to try to distinguish water consumption from leakage, the team took a limited number of in-depth samples, reading and recording water use during the early morning between 1 and 5 a.m.

4.3.4 Study Implementation

Building selection was completed by December 1995. The existing pipes, valves, and bypass lines were reviewed for sufficiency. The diameter of the meter (meter capacity) was determined based on the number of apartments in the building to be metered. In many cases, the team added a transition pipe from the existing pipe diameter to that of the pipe entering the meter (see Figure 4.2). Meters were purchased locally.

The team then sought to develop a list of contractors and draft contracts for meter installation. Because only one firm was found in Orenburg with prior experience in hot and cold water meter installation, that firm was selected. The contractor installed the meters based on schedules provided. Data collection on water flows commenced in late December 1995 and ran for about three months.

Figure 4.4
Example of Reading and Consumption Computation Form

Address: Chkalova 57/1 790 tenants
3/2/96

Date/Time	READINGS						Total consumed, cubic m	Period, hr	Average per person 24 hr	Average, cold	Average, hot
	Cold water, meter	Cubic m, cold	Hot water meter, supply	Cubic m, hot, supply	Hot water meter, return	Cubic m, hot return					
2/28/96 14:30	914.5		767.8		2427.2						
2/29/96 12:00	1056.4	141.9	1093.3	325.5	2678.7	251.5	215.9	21.5	0.305	0.201	0.105
3/1/96 8:30	1196.3	139.9	1411.8	318.5	2926.8	248.1	210.3	20.5	0.312	0.207	0.104
Total/Average		281.8		644		499.6	426.2	42	**0.308**	0.204	0.104

4.4 Preliminary Results

4.4.1 Costs of Residential Metering

In terms of equipment and installation expenses on a per building basis, metering a Type 3 building costs, on average, more than twice as much as metering a Type 1 structure (US$1,307 versus US$570, respectively; see Table 4.3).[36] Consistently more meters and valves were required for Type 3 than for Type 1 buildings. Installation times were also longer for Type 3 buildings, resulting in greater labor costs.

Table 4.3
Water Metering Costs

#	Address	Type	# of apartments	# of tenants	Water Meter Setting Elements							Cost		
					Bypass	Water meters			Valves			Total	Material, equipment	Assembly, installation
						Required	Exist	New	Required	Exist	New			
1	Amurskaya, 2/1	2	80	71	Exist	2	1	1	5	5	0	$220	$134	$86
2	Znamenskikh, 11	1	80	191	Exist	1	0	1	3	1	2	$470	$277	$193
3	Znamenskikh, 9	1	80	176	Exist	1	0	1	3	0	3	$595	$380	$215
4	Turkestansk., 4b	1	40	69	New	1	0	1	3	0	3	$646	$388	$258
5	Tsentralnaya, 3/1	3	60	190	Exist	3	0	3	7	5	2	$968	$579	$389
6	Tereshkovoy, 10	3	108	320	Exist	3	0	3	7	4	3	$1,021	$630	$391
7	Chkalova, 57/1	3	240	790	New	3	0	3	7	0	7	$1,765	$1,365	$400
8	Gagarina str., 33	3		162	New	3	0	3	7	0	7	$1,473	$1,143	$321
	Total		688	1,969		17	1	16	42	15	27	$7,158	$4,896	$2,253

4.4.2 Normed versus Actual Water Use

The study has shown that, at the apartment building level, actual consumption generally exceeds the norm, signaling the possibility of capturing new benefits via metering. As shown in Table 4.4, the difference between actual and normed water use is greater for Type 1 apartment buildings

[36] Not enough data were collected from Type 2 buildings to permit thorough analysis.

(cold water only) than for Types 2 and 3 buildings (hot and cold water). Assuming no change in consumption, potential financial benefits to the Vodokanal from increased revenues would be proportional: 49% increases from metering Type 1 buildings, and 5% increases from metering building Types 2 and 3.

Table 4.4
Study Results: Water Consumption by Building Type
(expressed in liters per person per day)

Apartment Type	(a) Norm	(b) Actual Readings	(c = b-a) Difference	% Greater than Norm
1. Cold Water Only	170	270	100	59
2&3. Hot and Cold Water	260	290	30	12

NOTE: Assumes 2.8 people per household.

Our preliminary findings in metering consumption suggest that the average consumption of both types of buildings is approximately 288 liters per day per person, based on the weighted average of consumption (i.e., total volume of water consumed divided by the total number of people). But this is the "gross" consumption and includes apartment water losses. To determine consumption net of losses, the team read the meters during the 1:00 a.m. to 5:00 a.m. time period, when human consumption would be nearly zero and the measurement would represent the loss of water in the apartments with reasonable accuracy. By this method, the team identified a loss of approximately 20% of that consumed by the apartments (this also is based on a weighted average). Given this loss, we would arrive at an average "useful" consumption of approximately 240 liters of water per person per day, regardless of the type of water supply the building received.

4.4.3 Actual Water Consumption versus Loss

Metered water use at the apartment level captures household consumption and water loss due to leaks. Metering at the building level would presumably encourage customers to repair leaky sanitary equipment. Estimating how much leakage is occurring in the study buildings provides insight into whether benefits would come in the form of increased revenues or in water savings.

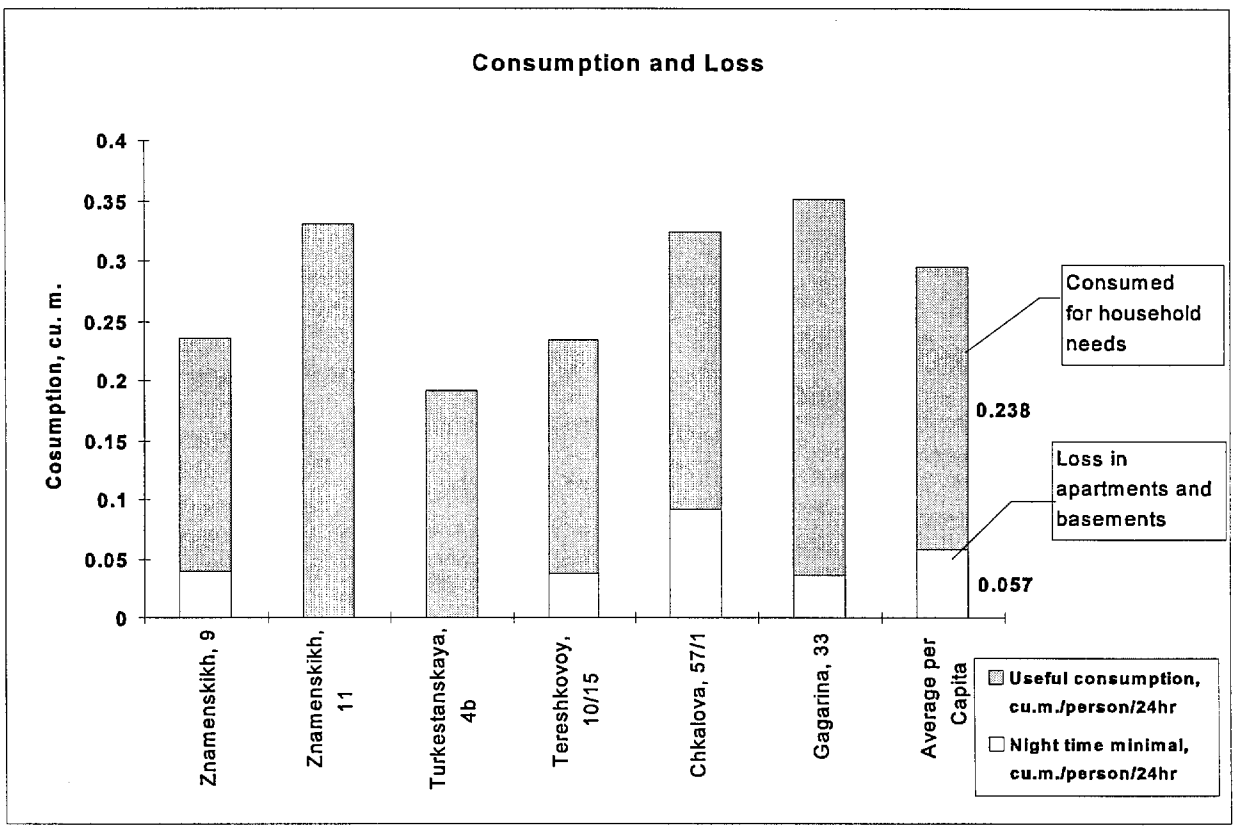
By comparing water use between 2 and 5 a.m. (when households normally consume little water) with daily water consumption, one can estimate water loss. Preliminary results suggest that about 20% of total water use represents loss rather than consumption (see Figure 4.5). This finding is close to previous Vodokanal estimates.[37] This significant level of loss suggests that, with metering at the apartment-building level, customers could reduce their bills substantially by repairing leaks, rather than curtailing consumption.

[37] Early discussions with the Chief Engineer and staff of the Vodokanal indicated a 25-30% estimated loss in the apartments.

During the night reading, in buildings with cold and hot water supply, almost 100% of the water flow was through the cold water pipes. Since there was no (or negligible) consumption of hot water, one can assume that the primary source of loss is in the water closet equipment using only cold water. Also during this night time reading, visual observation of the basements revealed a very small percentage of leakage in the basement amounting to not more than 5% of the total loss.

See Chapter 3 for analysis of the benefits of metering and tariff reform, based on these results.

Figure 4.5
Consumption and Loss Results



4.4.4 Technical Considerations for Possible Extension of the Demonstration Project

By the end of March 1996, 17 meters installed in 8 buildings had been in use for a total of 568 meter-days. The following describes the technical problems encountered and lessons learned to date. Those lessons should be borne in mind when considering extending the exercise to other residential apartment buildings, and when designing such a program.

Meter Reliability

The team initially selected 18 turbine type meters for certification and installation. Three firms in Orenburg had some meters available ranging in sizes from 50mm to 80mm. However, it was difficult to buy meters in bulk. The team often had to wait for a supplier to acquire meters in the

sizes we needed. One of the meters purchased proved to be defective; 5% of the meters were faulty. All selected meters were tested and gauged by the Vodokanal laboratory and certified and sealed by the independent Federal Standards Committee representative.

Since meters are sold in other cities in Russia, a broader competition for supply of meters might result in greater cost savings than was found in Orenburg. Further opening bidding to international and local firms would permit specifying more stringent technical standards than could be done in Orenburg.

Filters

During the early period of metering, the team found that it needed to install filters prior to the water entering the meter, even though the meter specifications did not call for filtration. This was due to the heavy level of solid materials in the lines, most likely rust and metal particles from the insides of pipes. During the first 415 meter operating days of our project, there were six incidences of clogged meters. This required taking the meter out, evaluating the reason for the clogging, and unclogging it. After the team installed filters, the project experienced only one meter clogging incident.

Installation Considerations

The contractor used a team of three people. It took the team 4-6 hours to install the pre-assembled water meter unit. However, special consideration should be given to the following.

- Low temperatures may prevent or delay the installation because the risk of the shut-off valves freezing in the street may be too great.
- Locating the proper shut-off valves may also be a problem (because of a lack of as-built drawings). This needs to be done well in advance of the actual meter installation to make sure the right valves have been located and work properly.
- Inadequate spacing or pipe configuration in the basement may exist and may require replumbing.

Finally, when installing meters in the residential buildings, it will be necessary to identify those areas of the buildings that are used for commercial purposes, and ensure that they receive a separate meter. This may require additional plumbing, but is essential to remove the commercial-metered consumption from the residential-metered consumption of water.

Social Considerations

A broader-scale metering project would require community acceptance to be successful. At a minimum, a publicity campaign should be mounted parallel to installation of meters, informing customers of the benefits of metering and answering questions that may arise. Furthermore, individual apartment dwellers may not accept the results of building meterings, claiming that the high consumption figures are due to losses in neighboring apartments. To meet these concerns, vodokanals should consider allowing apartment owners to install meters within their apartments at their own costs. Truly low-income households might be provided with one-time subsidies

recovered through general tariffs to enable to them to purchase and install the meters. The longer-term benefits to the Vodokanal would outweigh initial installation costs.

4.5 Considerations of Cost-Effectiveness

Results generated from the metering demonstration activity suggest that metering residential customers at the building level can be cost-effective, even at current subsidized tariff levels. That cost-effectiveness would only increase as tariff levels were raised to permit full cost recovery. Benefits would accrue in the form of either increased revenues or else in volume of water conserved. Since the difference between actual and normed water use is greater for cold water-serviced buildings, metering those buildings could yield the largest increases in revenue. A cost-effective plan for metering the entire city's apartment stock could therefore begin by first metering cold water buildings (Phase 1), followed by other apartment buildings (Phase 2).

Metering buildings at the level of individual apartments appears less feasible. The plumbing layout and building design did not anticipate metering. Metering individual dwelling units would be particularly infeasible under current subsidized tariff conditions.

4.6 Affordability and Willingness to Pay

Affordability and willingness to pay are two elements that play a significant role in the Orenburg political and administrative policies on tariff increases. But how accurate and clear is the picture that public officials use to formulate their political and administrative policies? What would the financial impact be on the average Orenburg family if the billing for water were based on metered consumption? What would the financial impact be on the average Orenburg family if the tariff charged were changed to reflect current consumption as metered, but an effort to reduce waste/loss were made? Finally, what would the financial impact on the average Orenburg family be if the "full cost" of water were charged?

The current tariff in effect is based on the "full cost" of a cubic meter of water costing 924 rubles. Current federal legislation requires that 40% of "full cost" be charged to the household.[38] The Orenburg residential consumer of water thus pays 370 rubles per cubic meter of water, or 40% of 924 rubles. The same legislation also sets a limit to be paid for communal services at 15% of the total family income. Anything over 15% must be subsidized by the city or some other group (reminiscent of the situation in Orenburg, where the burden is shifted to the enterprises as a cross-subsidy).

What would the financial impact be on the average Orenburg family if meters were installed and consumption billed based on the metered consumption? As shown in Table 4.8, the financial impact on the average Orenburg family is 0.2 percent of family income.

[38] The terms "residential unit" and "average family size" are used to mean three persons — an approximation of the 2.8 statistical average per dwelling unit reported for Orenburg.

Table 4.8
Financial Impact on Average Family from Metering

	Average Family	Billed Annually (in rubles)	Average Family Annual Income (in rubles)	Percent of Family Income
Current Norm Volume of Consumption	285 m^3/yr.	105,450	4,057,200	2.6
Metered Consumption Volume of Water	312 m^3/yr.	115,440	4,057,200	2.8

NOTE: Billing based on current subsidized rate of 370 rubles/m^2 of water.

It is also beneficial to look at the financial impact on the Vodokanal. Table 4.9 lists the volumes and revenues for the current system along with that for metered consumption. It shows that Vodokanal revenues would increase by 28% if residential customers were billed according to metered consumption rather than norms.[39]

Table 4.9
Revenue Impact of Metering on the Vodokanal

	Volume of Water Sold Based on Norm (cubic meters)	Volume of Water Sold Based on Metered Consumption (cubic meters)	Revenue Generated using Norm and Current Tariff (in 000 rubles)	Revenue Generated using Metered Consumption (in 000 rubles)
Cold Water Only	11,727,450	19,660,725	4,339,157	7,274,468
Hot and Cold Water	23,545,070	25,809,019	8,711,676	9,549,337
Total	35,272,520	45,469,744	13,050,833	16,823,805

NOTE: Billing in both cases based on current subsidized rate of 370 Rubles/m^2.

While still far from the goal of full payment for water by the residential customer class, this is a fair step forward without a very large impact on the average Orenburg family.

The next question that one may ask is: What would the financial impact be on the average Orenburg family if the tariff charged were changed to reflect current consumption, but also

[39] Assuming that installing meters and billing accordingly would not influence consumption patterns.

include an effort to reduce waste/loss in the residential unit?[40] This impact can be seen in Table 4.10 in which the impacts of the waste/loss program are combined with the "life-line" tariff described in Chapter 3.

Table 4.10
Impact on the Average Orenburg Family of Metering and Effort to Reduce Loss

	Average Family Consumption	Billed Annually (in rubles)	Average Family Income (in rubles)	Percent of Family Income
Consumption Based on Current Norm	285 m^3/yr	105,450	4,057,200	2.6
Volume of Metered Consumption, including:	312 m^3/yr	186,335	4,057,200	4.6
under "life-line"	*241 m^3/yr*	*107,201*	—	*2.6*
over "life-line"	*71 m^3/yr*	*79,134*	—	*2.0*

NOTES: Billing under norm based on current subsidized tariff of 370 Rubles/m^3. Billing for consumption under "life-line" tariff set at Scenario 2 subsidized level, or 445 rubles/m^3, while billing for consumption above the "life-line" tariff set at 1,113 Rubles/m^3.

From Table 4.10, we begin to see a more significant, but still not radical, impact on the household income. Average tariffs would increase to about 4.6% of household income, or by about 2%. However, if households consume at or below the life-line limit, the impact on affordability is minimal.

Table 4.11 shows the financial impact on the Vodokanal of such changes. The table compares two options: (1) current situation (normed-based billing) and (2) metering with the policy of reducing waste/loss of water. The financial impact on the Vodokanal is striking, as revenues more than double under the latter scenario, increasing from 13 billion rubles to 27 billion rubles per year.[41]

[40] E.g., a program aimed at encouraging conservation and reducing or eliminating losses, through encouraging households to repair leaking toilets and faucets.

[41] As this calculation does not take into account reduced consumption due to the effects of the "life-line" tariff, the actual revenue increase would probably be less once households eliminate losses and begin consuming near the "life-line" limit. Production costs, however, would decrease under those circumstances, resulting in savings.

Table 4.11
Financial Impact on the Vodokanal of Metering and Effort to Reduce Residential Loss

	Volume of Water Sold Based on Norms (cubic meters)	Volume of Water Sold Based on Metering (cubic meters)	Current Situation: Annual Revenue from Norm- Based Billing (in 000 Rubles)	Alternative Situation: Annual Revenue Based on Metering (in 000 Rubles)
Cold Water Only, including:	11,727,450	19,660,725	4,339,157	11,744,352
under "life-line"		*15,176,700*		*6,753,632*
over "life-line"		*4,484,025*		*4,990,720*
Hot and Cold Water, including:	23,545,070	25,809,019	8,711,676	15,417040
under "life-line"		*19,922,752*		*8,865,624*
over "life-line"		*5,886,267*		*6,551,416*
Total	35,272,520	45,469,744	13,050,833	27,161,391

NOTE: Tariffs set at levels noted in Table 4.10.

Finally, what is the financial impact on the average Orenburg if the "full cost" were charged? Table 4.12 shows that the "full cost" without cross-subsidy would require, on average, 8.6% of the average Orenburg family total income. This level of tariff increase combined with similar increases in other communal service tariffs would probably be unaffordable for most households. Given the fact that there are several other communal services that would also like to increase their tariffs, it is unlikely that policy-makers would be willing or able to commit so much of the municipal budget for subsidies, as it would have to under the current legislation. However, the idea of unbundling water and sewer alone from the "package" of communal services deserves further review and study. If this were done, it would enable those services that were unbundled to charge "full cost" and address their most pressing needs. That is, it would break down the whole package of communal services into manageable pieces.

Table 4.12
Financial Impact on the Average Orenburg Family Paying "Full Cost"

	Average Family	Billed Annually (in rubles)	Average Family Annual Income (in rubles)	Percent of Family Income
Current Norm Volume of Consumption	285 m^3/yr	105,336	4,057,200	2.6
Metered Volume of Consumption	312 m^3/yr	347,256	4,057,200	8.6

NOTE: Metered consumption billed at full Scenario 2 rates, 1,113 Rubles/m^3.

4.7 Metering and Measures for Reducing Enterprise Cross-Subsidy

To what extent would implementing the above reforms permit officials to reduce the high tariffs currently paid by enterprise/industries? Table 4.13 shows that, under reform conditions, the ratio of enterprise to residential tariff levels could be reduced from its current level of 7.27 to 5.24, while still generating 69.6 billion rubles per year for the Vodokanal.[42] Tariffs paid by enterprise/ industry customers could be reduced still further if the rates paid by residential consumers for consumption over the "life-line" minimum were raised.

[42] Calculation assumes: no changes in water production and consumption for non-residential customers; changes in consumption and billing for residential customers based on the pilot metering experience; imposition of a "life-line" tariff to residential customers as described earlier; and that budget organizations would continue to pay tariffs based on "average" costs.

Table 4.13
Impact on Enterprise Cross-Subsidy from Metered Consumption and Waste/Loss Reduction

	Consumption (cubic m per year)	Tariff (rubles per cubic m)	Total Revenues per Year (rubles)
Residential, Type 1, including:	19,660,725		
under "life-line" tariff	15,176,700	445	6,753,631,500
over "life-line" tariff	4,484,025	1,113	4,990,719,825
Residential, Type 2, including:	25,809,019		
under "life-line" tariff	19,922,752	445	8,865,624,640
Over "life-line" tariff	5,886,267	1,113	6,551,415,171
Total Residential	45,469,744		27,161,391,136
Federal Budget Organizations	3,706,073	1,113	4,124,859,249
Municipal Budget Organizations	1,693,927	1,113	1,885,340,751
Total Budget Organizations	5,400,000		6,010,200,000
Enterprises	11,640,000	3,127	36,401,753,936
Total Metered Consumption	62,509,744	1,113	69,573,345,072
Enterprise/Residential Ratio		5.24	
Affordability Assessment			
Annual Family Income			4,057,200
Annual Family Consumption	312		186,268
under "life-line" tariff	241	445	107,245
over "life-line" tariff	71	1,113	79,023
Percent of Family Income			4.6%

Chapter 5
Recommendations

Below we provide recommendations that are targeted primarily at (1) local and (2) federal levels. Local-level recommendations, believed to require no changes in the federal-level legal framework, are the focus of this assignment. Instances where the city has already begun to implement recommendations are cited in the text. As noted below, some level of oblast involvement is needed to implement most of the recommendations. Priority recommendations are indicated with bold type and are recommended for immediate implementation.

5.1 City-Level Recommendations

Recommendations for the Orenburg Vodokanal generally follow the order of topics presented in the report: 1) determining costs, 2) setting tariffs, 3) billing and collecting, 4) enforcement, 5) metering, and 6) general/miscellaneous. The Vodokanal (and other entities noted) should do the following.

5.1.1 Determining Costs

Recommendation 1. (Priority). Identify a portion of large accounts receivable as a bad-debt expense, and include these costs in the water tariff. An initial, straightforward way to calculate this expense would be to identify the total value of accounts that are three months or more overdue, and then to calculate a percentage of that amount as the expense. This percentage should approximate the historical proportion of total accounts receivable that are never paid. In the example in Chapter 2, a 30% ratio was applied if the city and Vodokanal made no additional efforts to collect delinquent payments, and a 5% ratio if they did pursue such a strategy.

A more thorough way to deal with large accounts receivable would be to periodically review those accounts to distinguish between those that are still potentially collectable and those that should be written off as bad debt. This determination would help the Vodokanal focus its collection efforts, as well as to clarify its financial position.

Recommendation 2. Include in the tariff the cost of providing new capital (new lines, wellfields, line extensions, new treatment plants, etc.). As discussed in Chapter 2, the city currently provides new capital. However, this arrangement separates those responsible for the actual service provision from those providing the assets with which to carry out that service. The control, timing, amount of expenditure, and planning need to be the responsibilities of the Vodokanal. It needs to be given the authority to attain genuine independence in service delivery.[43]

[43] Recommendation 2, in addition to city-level action, would also require changes in federal enabling legislation. See Section 5.2, below.

5.1.2 Setting Tariffs

Recommendation 3. (Priority). Establish an automatic increase mechanism for tariffs to compensate for the impact of inflation. The city and oblast should allow the Vodokanal to, as needed, automatically increase its tariff every quarter. The escalation permitted should be pegged to increases in an average of the published inflation rate for electricity and the published rate for industrial production costs/prices.

Recommendation 4. Establish an independent regulatory commission charged with reviewing and approving or rejecting requests to change water tariff levels. The authority of this commission would supersede the current decision-making powers of the city and oblast in the area of approving water tariff increases. Such a commission should include appointed representatives from the city and oblast, as well as one representative each from the following major customer groups: residential apartment buildings, single-family residential, budget organizations, and enterprise/industry. To reduce political pressures, its decisions should be binding. The commission should have the right to (and should be encouraged to) hold public hearings, and should collect oral and written testimony relative to tariff increase proposals.

Recommendation 5. Establish a two-tiered "life-line" tariff for residential customers. The commission described above should have the right to establish a two-tiered tariff system (or "life-line" tariff) as described in Chapter 3. This tariff should charge residential customers the full cost of water if their consumption exceeds a basic norm related to average household consumption. In Chapters 3 and 4, we discussed a series of options for increasing residential tariffs, including the "life-line" tariff concept. All of these options are affordable for households with average incomes. It is conceded that the residential consumer can bring very substantial political pressure to bear on the process and that policy-makers will be ever mindful of this fact. But some movement in the direction of lowering the high level of cross-subsidy is possible. What is proposed is a small increase in the "burden" that the residential consumer must pick up, a burden that would go a long way in demonstrating to donor institutions and lenders that Russia is continuing with market reforms in the communal services sector.[44]

Recommendation 6. Reduce the mandated cross-subsidy paid by the enterprises as much as possible, while still receiving adequate revenues. Enterprises currently pay more than seven times as much for the same cubic meter of water as households. Enterprises are, in effect, cross-subsidizing household consumption. This is inequitable and makes enterprises less competitive.

The primary way to reduce this cross-subsidy would be to raise tariff levels for households. This action would require federal action and is discussed in Recommendation 20, below. Another approach that the Vodokanal could pursue without seeking major changes in the federal legal framework would involve realizing cost savings from residential customers through metering their water use. After paying debts associated with metering and making other outlays necessary for

[44] This action may also require changes in federal enabling legislation. See Section 5.2, below.

service provision, cost savings achieved through a metering program could help reduce tariff levels imposed on enterprise customers.

While it is important to consider the ability and willingness to pay on the part of the residential consumer, it is equally important for the Vodokanal to be able to pay its bills. Additionally, it is necessary for the Vodokanal to be able to keep a high level of maintenance and repair if the quality and quantity of the water is to be acceptable. By metering and charging based on metered flow, one begins to identify the areas of water loss and to put pressure on the residential consumer to reduce at least the loss due to leaky sanitary equipment. Reductions in consumption/loss brought about by metering should, in turn, reduce Vodokanal expenses and improve cash flow. For reasons of equity, these savings should be realized and applied to the reduction of the tariff applied to the enterprises. Coupled with an aggressive collecting campaign, total revenues from enterprise/industry customers could even increase under those conditions.

5.1.3 Billing and Collecting

As possible, given its limited autonomy, the Vodokanal should design and implement an aggressive campaign to improve collections. Such a campaign should feature separate strategies for each major group of customers, and should focus limited resources where they will yield the greatest benefits. The campaign should include the following elements.

Recommendation 7a. (Priority). The City Department of Housing and Communal Services should transfer all collections received for water services to the Vodokanal in the form of cash, rather than as promissory notes. Those monies should be transferred weekly rather than monthly. At the same time, the city should make information on accounts payable easily and routinely accessible to the Vodokanal. If this recommendation had been fully implemented at the beginning of January 1995, it would have provided the Vodokanal with at least 6,689,372,000 rubles in revenue over the course of that year (see Chapter 2). Up-to-date information on account status, ideally provided via a computer network link, is essential for any serious effort at improving collections from delinquent customers.

If Recommendation 7a cannot be implemented or does not yield substantial increases in revenues, Recommendation 7b, below, should be pursued.

Recommendation 7b. Evaluate the transfer to the Vodokanal of responsibility for billing and collecting from all general population customers for water and wastewater services, and implement that transfer. The Vodokanal would have a greater incentive to achieve high collection rates than does the city, which currently administers these collections. If the Vodokanal were to take over the direct collection, it then would also have more of the information needed to crack down on delinquent rate-payers. This move would also act to "unbundle" the billing and collection process for water and wastewater from billing and collections for other communal services. This would establish a more direct connection or contract between customer and service provider, and would represent a step toward treating water as a separate, economic good.

Recommendation 8. (Priority). To the extent possible, insist on cash payments in place of payments in notes (promissory and treasury), and bartering for goods and services. While creative survival tactics, these forms of non-cash payments are not normally considered prudent business practices. They reduce cash available for providing services.

Recommendation 9. (Priority). Require municipal budget organizations to pay for water service at the rate level set for budget organizations. The exception granted to allow municipal budget organizations to pay for water service at the artificially low rates set for the general population, instead of at the normal rate for budget organizations, erodes the image of fairness, impartiality, and autonomy of the Vodokanal, inviting others to lobby for similar preferential treatment. Eliminating that exception would also act to generate additional revenue for the Vodokanal.

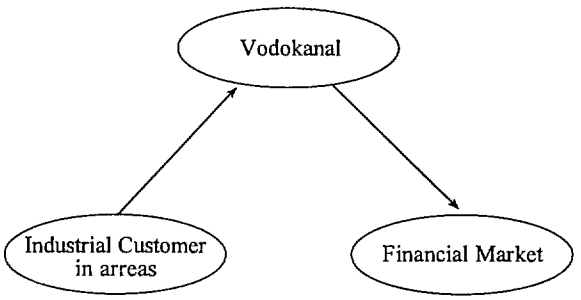
5.1.4 Enforcement

Recommendation 10. (Priority). Levy fines for late payments to the full extent permitted by law. As noted above, fines can be levied for late payments at a rate of 1% of the outstanding amount per day. Under current billing and collection arrangements, the Vodokanal and city should each levy fines to their corresponding customer subgroups. As with other revenues collected, fines collected by the city should be distributed among communal service providers on a pro-rata basis. If the Vodokanal assumes responsibility for billing and collecting from all customers (see Recommendation 7b), it should likewise assume the task of enforcing collections (including fining) from all customers as appropriate. Fining should generally only occur when cost-effective, i.e., when the additional revenues collected through fining substantially outweigh the extra administrative costs entailed.

Recommendation 11. Take nonpayers to court. Where appropriate, liquidify the debts of industrial customers through a forced conversion of their debt into equity. Existing Russian law provides for such conversions; such procedures have already been used successfully in the energy sector. Under this scheme, the Vodokanal would receive debt equity backed by the customer's assets (see Figure 5.1).[45] The water authority would then sell the debt in the domestic capital market.

[45] A slightly more complex alternative procedure would be as follows. The Vodokanal exchanges the debts owed to it by its industrial clients for blocks of liquid debt instruments backed by assets, which are issued by a consortium of domestic investors specialized in unbundling enterprise arrears. This asset or note is then passed through to the Vodokanal, which, in turn, liquidates it in the secondary market.

Figure 5.1
Debt-Equity — Cash Scheme



Recommendation 12. Design and implement procedures for shutting off water to customers, buildings, and/or households where it is appropriate and according to existing laws. Spearheaded by the Vodokanal, the city and oblast should first agree on policies for shutting off service. Those policies should define which consumers and under what circumstances should be subject to shut-offs, etc. Next, the Vodokanal should develop and implement a plan and procedures for shutting off service. Those procedures should address: establishing or gaining access to a system of up-to-date information on customer payments; notifying non-payers about imminent service shut-offs and amount of money owed; negotiating with delinquent customers to set up a schedule for payment of debt; shutting off service when necessary; preparing for rapid reconnection after payment is made, etc. Until flow meters and shut-off valves are installed more frequently, use of this option will necessarily be limited.

5.1.5 Metering

Recommendation 13. Meter water consumption at the whole building level as a first step in a metering program. Before proceeding, evaluate results to determine whether it is economically and physically feasible to meter individual apartments. The metering pilot project in Orenburg indicates that the Vodokanal, and by extension other vodokanals, should meter at the whole building level in order to establish relatively quickly payment based on the measured volume of consumption. This will allow for policy changes and modifications in the tariff structure that relate specifically to the volume of water actually consumed, permitting greater efficiency, equity, and revenue generation.

As is discussed in Chapter 4, a publicity campaign should be conducted before the onset of metering to build public awareness and support. In addition, if individual household object to the results of building meters, they should be given the option of installing apartment meters if they take responsibility for repairs to internal plumbing. Low-income households might be given one-time subsidies to permit them to purchase and install apartment meters. These subsidies should be recovered through general tariff increases.

Recommendation 14. Continue to use a norm where metering of actual consumption has not taken place yet, but approve and use a "new" norm level that reflects actual consumption. The

Vodokanal cannot meter all the buildings in the city immediately. At best, it will take between six months and two years to meter all buildings at the building level that are not now metered. If the transition requires the replacement of new pipes as well as the meter and accompanying equipment, the time span may be longer. Therefore, it will be necessary to continue the use of the norm for some time. One can, however, adjust norms to reflect emerging new findings on household water consumption, adjusted downward to account for water loss (waste) in residential units. Preliminary figures for late night consumption suggest a loss of approximately 20%. If an apartment dweller objected to the adjusted norm, he or she could have an individual meter installed in the apartment and pay according to the measured consumption.

Recommendation 15. Require new buildings to be designed to allow for individual apartment metering, and design the buildings and plumbing in such a way as to reduce the number of meters it would take to meter the apartment. Our metering pilot project encountered technical difficulties in metering individual apartments. The configuration of the plumbing and plumbing design often would make metering difficult and expensive or impossible at the individual apartment level. Future construction and construction codes do not have to perpetuate this problem where design and construction flexibility could eliminate it.

5.1.6 General

Recommendation 16. Analyze information management needs, and incorporate computers more widely into Vodokanal administration. Computerizing would help decision-makers receive the information they need to make informed planning decisions, and to ensure transparency and accountability. Computers and computer networking would particularly assist staff in completing billing, accounting, and financial reporting. The Vodokanal or city should first, however, assess its current information systems and computer needs, to avoid adding computers on a piece-meal basis. Computer installation should be accompanied by staff training.

Recommendation 17. Reduce staff, or reassign to more useful tasks. A comparison with international standards suggested that the Vodokanal is overstaffed. To save costs, unnecessary staff should be let go or else transferred to more productive tasks. Computerization, for example, would probably eliminate certain positions in the Accounting Department. However, if the Vodokanal decided to strengthen its billing and collection activities, qualified personnel from the Accounting Department could be reassigned to carry out that effort.

Recommendation 18. Train Vodokanal staff on meeting current and future water and wastewater treatment standards. Treatment standards are expected to increase within the next two years. Following those new standards will involve training Vodokanal staff. To save costs, Orenburg Oblast should consider organizing and conducting those seminars for officials from different vodokanals in the region.

5.2 Federal Level

The assignment produced several recommendations that, to be implemented, would require changes in federal legislation. Recommendations point generally toward adopting the *public utility model* of water service provision — permitting the Vodokanal to be autonomous, to provide a well-defined service, to own assets, to administer the investment cycle, and to charge for services rendered, with public accountability and beneficiary participation as appropriate, all within an overall regulatory framework. Recommendations also address aspects of the *financing of capital investment*. The recommendations are not comprehensive, but instead reflect the scope of the assignment.

5.2.1 Toward the Public Utility Model of Service Provision

Recommendation 19. Transfer to the Vodokanal ownership of all water system assets and responsibility for capital investment for system extension and expansion. Reflect capital investment costs in water tariff. This recommendation addresses a recurring theme of the report: the Vodokanal's lack of autonomy from the city. To be genuinely self-sustaining, a water service provider should, within an appropriate regulatory framework, control all aspects of its costs, the timing of those costs, the ultimate size of those costs, and the management and provision of the service. With control over the capital investment cycle, capital costs should be reflected in Vodokanal user charges, including the monthly service charge. Among other effects, this recommendation would involve changes in the organic law for vodokanals, and in regulations that govern cost calculations.

Recommendation 20. Amend Decree 935, which sets the level of costs to be recovered from the general population for communal services, to clarify that the oblasts and cities may charge more than the minimum allowed by law. As amended, Decree 935 states that, for a given year, general population customers are required to pay a certain percentage of total costs for communal services, within a given range (e.g., 40-60% for 1996). The Decree should be amended so that targets represent the *minimum levels* of cost recovery to be achieved (e.g., at least 60% levels for a particular year). Note that the ceiling on communal service payments (15% of family income) would still remain in effect. Such a change would permit sub-national government to elect to exceed targets for cost-recovery if they chose to do so.[46]

Recommendation 21. Tighten restrictions on the issuance of promissory notes by municipalities and oblasts. The Central Bank and Ministry of Finance should ensure that a proper regulatory framework exists for the issuance of promissory notes by sub-national governments as a means of paying for the provision of water for the various budget organizations. This recommendation would serve to provide the Vodokanal with more cash revenues, thus allowing it to move toward full self-sufficiency by increasing the actual cash with which it has to work.

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[46] The Government of Ukraine currently follows this practice for water tariffs. The City of St. Petersburg has chosen to apply the maximum of 60% of costs for communal service provision to households. It is applying the revenues generated to center city rehabilitation.

5.2.2 Toward Effective Financing of Capital Investments

Recommendation 22. Continue the federal (sovereign) guarantees for loans made for water and sewer projects, and match them with oblast and city guarantees. As a strictly temporary measure, throughout the transition period from a centrally planned service-and-capital-investment basis for communal services to a market basis, the federal government may need to provide guarantees to international donors lenders. Until local agencies become more autonomous and financially robust, it will be necessary to look to the federal and, possibly, oblast levels of government for guarantee of payment for loans and bonds. At the same time, the federal government should focus on establishing a sound regulatory framework and local-level autonomy that would encourage the development of water and sewer bonds and other innovative debt instruments.

Recommendation 23. Consider alternative financing/funding strategies, including the use of concessions or build-own-operate (BOO) arrangements for water and sewer facilities. There may be a range of approaches that can be undertaken to supply the vodokanals with needed capital in addition to the traditional debt instruments. One suggestion is to consider the creation of a regional pool of money created by collection of a tax or levy of some sort from each residential customer in the cities (see Chapter 3 discussion). Another possibility is for the larger cities to consider signing long-term service operation agreements with private companies that would operate the facilities for an agreed-on fee. This service contract or concession approach is used in many other countries, and may be a method for encouraging future private investment in public facilities and services like water and sewer. Typically these service agreements are for long periods of time to cover the management and technical transfer of technology and procedures, as well as possible capital investments. The potential for this "tool" should be reviewed based on the specific circumstances of each city.