

**Tapping the Private Sector:  
Approaches to Managing Risk in Water and Sanitation**

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## Foreword

The economic and environmental importance of the water and sanitation sector is driving governments around the world to seek innovative approaches to harnessing private sector management skills and investment capabilities. This review of recent experience was undertaken to determine the extent and form of private involvement, the successes achieved, and the problems faced both by governments and the private sector.

The study highlights the variety of risks that occur in the provision of water and sanitation services and describes in considerable detail the mechanisms used to allocate and mitigate those risks. Where risks are clearly identified and managed, the prospects of success go up. Clearly, there is no magic bullet here: even the successful projects have faced challenges. However, the experience thus far leads to an optimistic prospect for the future. A variety of experiments are ongoing in all parts of the world. Some projects have faced challenges but typically all parties have demonstrated a willingness to find solutions that improve the basis for success. Looking ahead, the interests of governments and the private sector lie in continued efforts to identify arrangements that provide cost effective and quality service while rewarding risk bearing.

This study on the water and sanitation sector follows earlier reviews undertaken by the World Bank's Project Finance and Guarantees Department on private electric power generation and toll road projects. The Project Finance and Guarantees Department provides technical support in project structuring and is responsible for the World Bank's Guarantee Program. Further information on the Bank's Guarantees—and on the Department's publications—can be obtained by calling 202-473-1650.

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## Preface

Worldwide, the public sector finances, builds, operates, and owns most of the assets in the water and sanitation sector; facilities are often inefficient, service coverage and quality are inadequate, and cost recovery is poor. To extend coverage and improve the quality of service provided, municipalities around the world are turning to the private sector to rehabilitate and expand existing systems and build and operate new ones.

Based on accumulating experience, this monograph describes strategies to sustain private involvement and investment in the water and sanitation sector. It is addressed both to policymakers and to private operators, investors, and lenders that are engaged—or are likely to participate—in meeting the rapidly growing demand for water and sanitation services. The ability of the public and private sectors to recognize and acknowledge each other's viewpoints and expectations will be key to sustaining the efficient use of private initiative and capital.

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## Why are Private Initiative and Capital Important?

Governments worldwide are turning to private initiative and capital to address the significant operational failures and funding gaps in the provision of water and sanitation services. Although private investment in the sector has been much more modest than in telecommunications, power plants, and toll roads, considerable private activity has occurred in recent years. As the nine case studies described in the paper show, private capital has relieved pressures on government budgets and private initiative has increased operational efficiency. Private water and sanitation projects have, however, been concentrated in only a few countries, and they have encountered a variety of challenges. Despite these problems, pressures for moving ahead have resulted in pragmatic approaches to risk reduction and risk sharing in a variety of contexts, and the prognosis for the future is positive.

Developing countries spend about \$30 billion a year on investments in water and sanitation but easily need to spend twice that amount to serve those without essential services and to avert an environmental crisis in the decades ahead. Throughout the world 1 billion people are without safe water, and 2 billion are without safe sanitation. The most severe problems exist in low-income countries, where only about 60 percent of the population have access to safe water and only 40 percent have access to sanitation (table 1). These statistics fail to capture the full extent of the problem, since even those with access to services face low quality and poor reliability. Moreover, as urban populations continue their relentless growth, pressures on scarce water supply and the damage from polluted water threaten to cause irreversible damage to the environment and hence to the quality of life in many countries.

The water and sanitation sector has long been dominated by the public sector, which has left a legacy of serious operational deficiencies (box 1). The tradition and perception of water as a predominantly social service led to neglect of the sector's long-term economic viability and to massive undercapitalization.

The current situation presents both constraints and opportunities. On the one hand, the political nature of some problems (such as overstaffing and tariff setting) may deter private participation. On the other hand, the significant financial and operational problems of the sector provide a rationale for private participation. With governments in many countries unable to address the pressing needs of the sector, the private sector can potentially contribute significant financial resources to extend services. Financial resources alone will not solve the problem of inadequate water quantity and quality, however. If services are to be enhanced and expanded, operational inefficiency (high water losses, poor reliability, inadequate metering and billing) must also be overcome through harnessing the management and technical skills of experienced service providers.

The shift to private participation can create large benefits, but effective private involvement requires that governments play a new facilitation and regulatory role to create a credible—and hence low-risk—contracting and operating environment (box 2). A recent World Bank study documents that, in a number of projects, private enterprise has been associated with “substantial benefits to consumers in terms of expanded coverage and quality of services as well as significant improvements in productive efficiency” (Rivera 1996, p. 71). But the same study also questions the sustainability of these benefits and improvements without the implementation of complementary water pricing, financing, and regulatory reforms.

## Access to safe water and sanitation in developing countries, 1993

Country	Percentage of population with access to	
	Safe water	Sanitation
<i>Low income</i>		
Côte d'Ivoire	75	43
Ghana	56	27
Guinea-Bissau	25	29
Guinea	60	14
<i>Lower-middle income</i>		
Guatemala	60	71
Indonesia	42	55
Philippines	81	72
Slovak Republic	77	51
Turkey	92	95
<i>Upper-middle income</i>		
Argentina	64	89
Chile	86	83
Malaysia	78	94
Mexico	80	66

*Note:* Though these data refer to 1993, the coverage ratios are unlikely to have changed much since then. Definitions of coverage vary across countries and are therefore not always strictly comparable. Reported coverages also vary somewhat across the sources cited. The relatively high coverage ratios for sanitation in some countries reflect extremely rudimentary services.

*Source:* United Nations (1996), World Bank (1995), World Resources Institute (1996).

### Box 1

#### The legacy of public sector management

Significant opportunities for operating improvements indicate that water enterprises face weak internal (organizational) and external (regulatory) incentives to perform. Unaccounted-for water, which measures the combined effects of physical leakage and unauthorized withdrawal, is a frequently used summary measure of operational efficiency. For efficiently managed water utilities, unaccounted-for water is generally in the range of 10–20 percent. In many developing countries unaccounted-for water rates average between 40 and 60 percent, indicating poor management (Cowen 1995). Public water systems also tend to be overstaffed, with five to seven times as many employees per connection as in other utilities (Serageldin 1995). Water quality standards are also low.

The massive cost of underpricing, inadequate collection, and inefficiency is a key force driving governments toward privatization. Revenues collected by municipal utilities cover only about a third of the cost of water; subsidies from the underpricing of water amount to about \$20 billion a year (World Bank 1994). In addition, operational inefficiency costs governments almost \$10 billion a year (World Bank 1994).

Raising prices to cover costs and reducing system losses would thus be almost sufficient to finance the current level of expenditures on water. In the past, concern for the poor has been stressed as a key reason for keeping prices low. However, because large portions of the population did not have access to services, the benefits of the subsidies accrued principally to the wealthy or well connected. Greater access to water supply and explicit subsidy mechanisms will be required to serve the interests of the poor.

### Box 2

#### How is the water and sanitation sector different from other infrastructure sectors?

The distinctive features of the water and sanitation sector are the source of many risks, and they explain the lower levels of private investment in the water sector relative to the power, telecommunications, and transportation sectors. All of these features underscore the importance of government commitment to mitigate risks in order to attract private participation.

First, capital intensity is high and large sunk costs are involved, thus limiting the scope of direct competition and creating the need for a credible regulatory framework to protect consumers from excessive charges and investors from “creeping expropriation.” Water assets often last 30–50 years, with depreciation rates of only 3–5 percent a year. To keep tariff levels low, the payback period for water investments is usually amortized over 15–30 years. Long-term financing is thus needed to finance these investments. The lack of effectively functioning domestic capital markets in most developing

countries represents an important obstacle to private investment, and reliance on long-term international lending creates substantial currency risks.

Second, multiple public policy objectives (economic efficiency, environmental enhancement, the protection of health, and the affordability of tariffs, as well as broader fiscal and political goals) accentuate political and regulatory uncertainty. All infrastructure sectors must meet multiple policy objectives, but the problem is particularly acute in water and sanitation because of the serious health and environmental consequences of substandard service provision.

Third, the sector is highly fragmented. Water differs from other network industries in that, relative to its value, the product is expensive to transport and cheap to store. This reduces the scope for long-distance transmission (except to water-stressed areas) and makes water a more local service than other infrastructure services. The local nature of water and sanitation services means that investments tend to be smaller than they are in infrastructure sectors, such as power, in which investment is centralized.

Finally, the water and sanitation sector is characterized by a high degree of uncertainty about the condition of assets and thus the investment requirements. Private investors have only limited information about the state of the physical infrastructure (the pipes) and the customer base (the extent of illegal connections, for example). The condition and value of water and sanitation infrastructure is generally more difficult to determine than assets of other utility sectors because many of these assets are underground. As a result, underinvestment and improper maintenance can go unnoticed for years. Because private companies taking over water and wastewater systems may have difficulty estimating the costs of rehabilitation, tariff setting and adjustment can be subject to considerable uncertainty.

The problem of valuing assets has significant implications for the risks faced by private investors. If more investment is required than was expected in the initial tariff determination and tariff renegotiation is costly, private developers and investors may find that contractually agreed upon returns are insufficient. The difficulty of assessing the value of water and sewerage assets suggests that regulatory provisions for tariff adjustment and contract renegotiation will play a critical role in attracting and securing private capital to the sector.

## **Strategies for Attracting Private Initiative and Capital**

A variety of approaches have been used to attract private participation in water and sanitation (table 2). Different approaches have been adopted to varying degrees around the world. Even within countries at similar income levels, the nature and extent of private sector participation varies widely. In the United States, for example, less than 20 percent of the population is served by privately managed water utilities, and an even smaller portion of the population is served by assets that are privately owned. In contrast, public-private partnerships are more common in Europe. Activity among middle-income countries, such as Argentina and Malaysia, is growing, and they are likely to experience the greatest growth in private participation in the coming decades. But among middle-income countries, too, experiences vary. Chile, for example, a leader in privatization in other sectors, has been slow to seek private participation in the water and sanitation sector, primarily because its public water utilities have a reputation for efficiency. Private participation in low-income countries has been even more limited, and the value of the projects has been small. Given the enormous need for investment, however, activity is expected to grow, particularly as governments adopt economic, legal, and regulatory reforms that stimulate growth and attract foreign investment.

### **Management and Lease Contracts**

Tackling the long-term weaknesses in the distribution sector can also be done incrementally (box 3). This approach of gradually increasing private participation through contracting mechanisms—operations and maintenance (O&M) and lease contracts—has been adopted in many countries because of concerns about raising prices and the need to deal sensitively with the interests of the utilities' staffs. Management contracts give the private sector full responsibility for O&M services for a specific facility (such as a wastewater treatment plant) or an entire system. The private O&M contractor typically accepts performance-based fees, which are generally based on physical parameters, such as volume of water treated and achievement of environmental quality standards; the contractor may also bear the risk of legal liability for failure to meet environmental standards. The O&M contractor does not take on the investment and financing risks. The duration of management contracts is generally less than 10 years.

Because they may not require tariff increases or significant downsizing of staff, short-term management contracts may be politically more acceptable than forms of private participation such as concession contracts, which require cost recovery. Like corporatization, which involves transforming a utility into a financially and institutionally independent entity, management contracts offer a way to improve operational and service performance and thus prepare a utility for fuller privatization options. However, under this approach, the degree of private involvement is fairly limited and hence private initiative and capital are harnessed only to a limited extent. While this “stepping slowly” approach goes some way toward improving operational and financial performance, lines of authority and responsibility remain blurred and reliance on government budgetary resources for funding remains unchanged.

### **Build-Operate-Own (BOO) and Build-Operate-Transfer (BOT) Projects**

The most frequently employed form of private participation has been through special-purpose build-operate-transfer (BOT) projects for water sourcing, transmission, and treatment. In countries with limited financial resources and urgent needs for specific facilities, such as water or wastewater treatment plants, BOO/BOT contracts can be an efficient way to channel private investment and initiative to new facilities. Under a BOT contract the government-owned utility pays a private company to source water or treat a certain volume of raw water or sewage. To provide the basis for project financing, the revenue stream is secured through a take-or-pay arrangement, under which fixed payments are made whether or not the service is used. The contract length is negotiated to allow for retirement of



debt and provide a return to equity investors. At the end of the contract, which generally lasts 15–25 years, the private company transfers the facility back to the government. In contrast, the private company owns and operates the facility for perpetuity under a BOO contract.

While placing greater capital at risk than in management or lease contracts, the BOT/BOO arrangements do not deal with the inefficiencies of the distribution sector— water losses, lack of metering, and inefficient tariff setting. Indeed, these arrangements are often perceived as a short-term mechanism by which to avoid dealing with the long-term, less tractable, problems. In this respect, they follow the same philosophy that led to independent power generators under long-term take-or-pay contracts in the power sector. In both sectors the danger exists that the supply sources thus created will be inefficient because they supply a service that is not needed (in the worst situation the extra supply will be wasted where distribution losses are not stemmed). Greater coordination of supply and distribution investments is, therefore, required.

## Full Utility Concessions

A few countries have gone farther by awarding concessions for operating entire water and sanitation systems for fixed periods (25–30 years) and requiring an investment commitment on the part of the concessionaire. Although the outcomes are sensitive to the precise contractual and regulatory arrangements, recent evidence suggests that significant gains are possible.

## Privatization of Assets

Beyond such concessions lie the full privatization of assets, which has been done only in England and Wales, where privatization has transformed the once undercapitalized and underperforming water companies into viable and competitive enterprises.

TABLE 2

### Allocation of risks and responsibilities in alternative contractual arrangements

Allocation of responsibilities	Management contract	Lease contract	BOO/BOT concession	Full utility concession	Asset sale
Ownership	Government	Government	GovernmentGovernment	Private sector	
Investment	Government	Government	Private sectorPrivate sector	Private sector	
Operation	Private sector	Private sector	Private sectorPrivate sector	Private sector	
Tariff collection	Government/ private sector	Private sector	GovernmentPrivate sector	Private sector	
Selected recent cases	<ul style="list-style-type: none"> <li>• Puerto Rico (water and sewerage)</li> <li>• Mexico City (water)</li> <li>• Trinidad and Tobago (water and sewerage)</li> <li>• Antalya, Turkey (water and sewerage)</li> <li>• Gaza City (water and sewerage)</li> <li>• Indianapolis, U.S. (sewerage)</li> </ul>	<ul style="list-style-type: none"> <li>• Guinea (water)</li> <li>• North and South Bohemia, Czech Republic (water and sewerage)</li> <li>• Gdansk, Poland (water)</li> <li>• Szeged, Hungary (water and sewerage)</li> <li>• Cartagena, Colombia (water and sewerage)</li> </ul>	<ul style="list-style-type: none"> <li>• Johor, Malaysia (water)</li> <li>• Sydney, Australia (water)</li> <li>• Izmit, Turkey (water)</li> <li>• Chihuahua, Mexico (wastewater)</li> <li>• Puerto Vallarta, Mexico (wastewater)</li> </ul>	<ul style="list-style-type: none"> <li>• Macao (water)</li> <li>• Buenos Aires, Argentina (water and sewerage)</li> <li>• Malaysia (sewerage)</li> <li>• Limeria, Brazil (water and sewerage)</li> <li>• Côte d'Ivoire (water)</li> <li>• Batam, Indonesia (water)</li> <li>• Manila, Philippines (water and sewerage)</li> <li>• Gabon (water and electricity)</li> </ul>	<ul style="list-style-type: none"> <li>• Ten regional water authorities in England and Wales (water and sewerage)</li> </ul>

## Successful contract transformation in Côte d'Ivoire

Côte d'Ivoire's water utility is one of the oldest and longest-running privately operated systems in the world. Its operations are financially self-sustaining, its shares trade on the Ivorian stock market, it is operated almost entirely by Ivorians, and it is beginning to export its expertise and management experience to neighboring countries.

In 1959 the government organized an international tender for the right to operate the water supply system in the capital city of Abidjan, a city of about 300,000 at the time, under a lease agreement. The French water company Saur was awarded the 25-year lease contract. Two years later Saur signed agreements to manage five other municipal systems. After Côte d'Ivoire gained independence in 1960, a private Ivorian company, SODECI (the Côte d'Ivoire Water Distribution Company), took control of the lease, leaving Saur as the major shareholder.

Under the lease agreement, SODECI was responsible for the operation and maintenance of the system, tariff billing and collections, and new connections; the government was in charge of major investment, such as network extension. Operations were self-financed and tariffs collected by SODECI were allocated to the lessee as remuneration, to the Development Fund (for low-income connections, renewals, and new works), and to the National Water Fund (for debt service and sewerage). To ensure that low-income households had access to piped drinking water, SODECI structured a special tariff rate for poor households and offered free connection for pipes 15 millimeters in diameter.

In 1978 the company's shares began trading on the country's stock market. Over time the company took over responsibility for the management of sewerage and drainage systems. In 1987 the government broadened SODECI's responsibilities to include financing investments by granting the company a 20-year concession for the urban water supply. By 1997 SODECI's capital of about \$15 million was held by Saur (47 percent), SODECI Workers' Funds (5 percent), private Ivorians (45 percent), and the Ivorian government (3 percent).

Through the adoption of professional management techniques that have included a heavy emphasis on training and motivating staff, SODECI has transformed the country's water utility into a highly productive stand-alone business that serves more than 345,000 customers in 409 centers (136 towns and 273 villages), up from 40,071 customers in 38 centers in 1973. Staffing efficiency is high (about four per thousand connections), collection from private customers is 97 percent, and unaccounted-for water in Abidjan is only 17 percent.

## Managing Risks through Project Finance—and Beyond

Tapping substantial new sources of finance is a prime motivation for attracting private participation. Successful transition from the current system of government financing to private financing will depend on the establishment of a sound pricing and regulatory framework, which determines the future flow of earnings and their stability.

Governments would ideally like to eliminate their financial support to private projects. Incomplete reforms, continued subsidies to certain low-income consumers, and the risks associated with the transition from public to private management, however, require direct and indirect government financial assistance. To phase out such support over the long-term, it will be necessary to transform poorly performing utilities into economically viable enterprises with access to significant internal cash for investments and with the ability to raise resources from diverse sources on the basis of their balance sheets.

The evolution of private financing may be viewed as a three-step process. In the first step, the key mechanism is *limited-recourse financing*. Project equity and commercial lending are supported primarily by the cash flows and assets of the project, which may be a discrete BOT or a concession for a distribution system. Financing is also supported in part by recourse to the balance sheets of project sponsors and by various implicit and explicit government guarantees. In the second step, a stable set of rate-paying customers and some confidence in the regulatory system is established, and the basis for a sustainable water utility is created, leading to substantial investments through *retained earnings*. In the third step, capital market financing, especially *bond financing*, is likely to develop as the track record of stable revenue sources become evident.<sup>1</sup> Where private ownership of assets exists, *equity markets* can play an important role in disciplining the management of water utilities. Governments can support the development of capital markets through general measures and also those specific to the water and sanitation sector.

*Project finance* techniques have been the preferred method of attracting equity investors and lenders to water and sanitation projects. Like other privately financed infrastructure facilities, such as power plants, toll roads, ports, and airports, these projects are structured around a project's ability to generate a stable stream of future revenues. Nonrecourse or limited-recourse financing is based primarily on a project's future cash flows and its assets, rather than on the balance sheet of the government or the project developer. The direct link between a project's cash flow generation potential and funding gives the project sponsors, investors, and lenders strong incentives to ensure that projects are structured and operated to generate positive cash flows.

The high capital intensity of water projects and consumers' sensitivity to tariff increases indicate that the financing challenge for the water sector is to access long-term financing at reasonable rates to match the long-term payback period associated with the large investments required to rehabilitate and expand existing assets and construct new facilities. Additionally, for new investments such as BOT projects, the long gestation period from initial construction financing to operation and stable revenue generation may represent two or three years without debt repayment.

To date, debt has been the major component of the financing package. Most of this debt has come from official sources, including several international financial institutions and the export credit agencies (ECAs). Domestic financial institutions have provided financing in local currency in the more advanced countries, including Malaysia and Thailand; international commercial lenders have been unable to lend on their own account for tenors of 10 years or more, as required by these projects.

### The Fundamentals of Project Finance for Water and Sanitation Projects

Under limited-recourse project finance, a project's cash flow and risk profile determine the financial structure, sources of finance, and terms of lending. These profiles are affected by four main factors: (a) the type of contractual arrangement, (b) the stage of the project's development, (c) the availability of local finance (the presence of exchange rate risk), and (d) the underlying political commitment to secure private participation, as reflected by government undertakings (such as establishing an independent regulatory authority or raising tariffs to cost recovery levels before privatization).

The cash flow and risk profiles, security interest, and customer type for the different approaches to private sector participation in the water and sanitation sector are shown in table 3 (exchange rate risk, which is not shown, depends on the quality of local capital markets). The significant variation in the cash flow and risk profiles across projects and phases of project development suggests the need for different risk mitigation and financing strategies. Financially, certain entities are better suited to participating in project financing than others. Commercial banks, for example, may have specific sectoral and country expertise that enables them to shoulder and manage a project's financial risks; multilateral and export credit agencies may have specific knowledge and experience analyzing and managing country risk.

Allocating more risk to the private sector (that is, moving to the right along the continuum shown in table 3) entails increased commercial responsibilities, greater control, and a longer duration of private participation. Under a concession agreement, a project company's shares cannot be freely transferred or pledged; only under full asset ownership can the private operator use such assets as collateral. With rights to cash flows in perpetuity and a clear security interest in a utility's assets, asset ownership has the greatest long-term certainty of revenues, and it thus generally provides the greatest flexibility for financing new investment. At the same time, the greater monopoly concerns associated with asset ownership mean that government oversight will play a greater role, and thus regulatory risk will be higher.

## **Risk Management**

The reliability and timing of the cash flows and the allocation of risks influence the ease and sources of funding. All parties have an interest in requiring that risks are fully transparent and allocated to the project participants best able to mitigate them. The process of identifying, assessing, and assigning commercial and regulatory risks is, however, a difficult one. In water and sanitation projects, a variety of strategies have been adopted to deal with market and payment risks, construction risks, operational risks, currency rate and convertibility risks, regulatory and policy risks, and *force majeure* (table 4).

### *Market risks*

Market risks in the sector take the form of demand (ability and willingness to pay) risk and payment (or credit) risk (table 5). Under BOT/BOO arrangements, demand risk is mitigated through a long-term contract with the government utility, which bears the risk of nonpayment by customers. The utility commits to purchase a minimum amount of service over the life of the contract through so-called take-or-pay contracts. These contracts oblige payment even when services are not required; they thus give comfort to lenders that a project can service its debt. Payment risk exists nevertheless in BOT/BOO contracts, however, since the government entity purchasing the services may not be creditworthy. If the government entity is viewed as uncreditworthy, lenders and investors will require some form of credit support from the federal government or other third party (see box 4). In addition, escrow accounts may be set up to provide a cushion in the event of nonpayment.

In a lease contract, full utility concession, or asset privatization, the demand and payment risks are borne by the private operators, who sell services directly to individual consumers. Market risk arises because consumption by retail consumers may decline as a result of increased tariffs or greater measurement of consumption through metering.

Uncertainty associated with the drop in demand may be particularly high in developing countries in which meters have never been used or tariffs have been kept artificially low. Accurately predicting the consumer's response to a tariff increase is critical to ensuring that future revenue requirements are met. Lenders will generally seek independent appraisals of market demand and include sponsor guarantees and loan covenants to ascertain the ability of a project to service its debt out of cash flow.<sup>2</sup> Such risk protection measures have been used in concessions in Malaysia and Argentina and in the regional utilities in England and Wales.

Market risk may be particularly problematic in the case of sewerage concessions that are not bundled with concessions for potable water services. Consumers are generally more sensitive to paying for sewerage services than water services. This is especially true where individual households have traditionally relied on their own sewage disposal methods. Bundling the water and sewerage bill tends to reduce the risk of nonpayment.

An important aspect of market risk is the ability to secure payment from customers through the threat of disconnection. Private developers will be less willing to operate a water or wastewater system if this right is not contractually guaranteed and will look for some other form of guarantee to cover fixed costs. For example, in the national sewerage concession in Malaysia, where private operators do not have the legal authority to shut off sewerage service, the government guarantees a minimum rate of return.

### *Construction or completion risks*

Lenders and investors face the risk that the construction contractor will fail to complete a project on time, within budget, and per contract design specifications. Construction risks are especially important in BOO/BOT projects because of the long gestation period between the time lenders agree to finance a project and the time the first debt service payments are made. Lenders are sensitive to delays in completion, abandonment, cost overruns, and failure of a facility to achieve stipulated performance levels, all of which may adversely affect the timing and level of cash flows.

Lenders and investors will generally insist that sponsors allocate construction risks to reputable engineering construction companies through strong fixed-cost, date-certain turnkey contracts. These contracts guarantee completion and, where applicable, performance; they provide for liquidated damages if guarantees are not met.<sup>3</sup> The performance of the contractor may also be backstopped with an insurance package that includes a performance bond, letters of credit from reputable financial institutions, and pledging of the contractor's capital through an equity stake in the project.

Governments are able to impose heavy penalties for failure to meet completion dates. In some agreements, for example, the project company is required to pay the government water authority a substantial lump sum for each week beyond the scheduled construction period that the plant remained uncompleted. Once the maximum delay is reached, the water authority can terminate the contract. The project company may also provide a performance bond for the construction of the plant for an amount equivalent to a substantial percentage of the value of the plant's construction and equipment.

### *Operational risk*

The main operational risk in water and wastewater facilities is that they fail to meet the agreed upon performance parameters. Sponsors are generally required to put up performance bonds as guarantees of their operational obligations and to pay penalties if performance standards are not met. The amount of the performance bond is typically equal to an average year's capital expenditure program, so that if the private party were to default on performance targets and be asked to leave, the government could use the performance bond to fund capital expenditures before a new operator was put in place.

### *Currency exchange and convertibility risks*

A fundamental concern for foreign sponsors, lenders, and equity investors is the ability of a local project to generate revenue in a currency that maintains value and can be converted to foreign exchange. Because water and sanitation projects generate revenues in local currency, the convertibility of the local currency is essential to obtaining financing. The relatively low imported content of water infrastructure projects also means that less foreign financing is required than in other infrastructure sectors, such as power or telecommunications.

To protect against adverse fluctuations in cash flow, sponsors require that tariffs be indexed to exchange rate fluctuations (as well as to inflation and interest rate changes). Two-part tariff formulas for BOO/BOT projects such as those in Johor, Malaysia, and Sydney, Australia, provide a means of indexing variable and fixed costs to local inflation. In England and Wales the price-cap formula automatically links tariffs to changes in the price level. In addition, reserve funds can be set aside to mitigate against devaluation risk.

### *Regulatory and political risks*

Regulatory and political risks include the risk of expropriation, regulatory interference (such as unilateral changes in contracts), early termination, and change of law. These are risks that the private sector is not in a position to evaluate or shoulder. The special attributes of water and wastewater projects—their local nature, the need for tariff and environmental regulation, the difficulty of determining the asset value of underground pipes—accentuate these risks. Municipalities with little if any regulatory experience often become responsible for significant regulatory functions.

The high level of exposure to regulatory and political risks creates significant investment uncertainty. To mitigate these risks, private parties to water and wastewater companies and concessions have relied on various mechanisms (table 6). A basic level of protection is established by the chief regulatory instrument, the concession contract, the credibility of which depends on how well it assigns and enforces the rights and obligations of the concessionaire and provides for fair and workable contract and tariff renegotiation rules (Crampes and Estache 1996).

Ensuring the credibility and fairness of the regulatory entity charged with monitoring and enforcing a concession agreement's obligations and regulatory requirements further mitigates regulatory and political risk. The presence of an independent regulatory agency—such as ET OSS, in Argentina—diminishes the risk of political interference.

The obligation of the government or regulatory entity in the event of early termination is of significant concern to lenders, investors, and sponsors. Lenders in particular look for early termination clauses in concessions that, depending on the circumstances, enable them to “get out whole.”

### *Force majeure*

Force majeure risks are those that are beyond the control of the private sector or the government parties to a contract. Under force majeure, either party has the right to suspend obligations under the contract. Force majeure events include domestic political events, such as wars, riots, general strikes, and changes in laws, and “acts of God,” such as natural disasters, fires, and epidemics.

## **Elements of Financing: Structure, Maturity, and Sources**

Because water and sanitation projects create long-lived assets, with cash flows that grow slowly, financing requires debt structures with long maturities. The limited ability and willingness of consumers to pay also requires that debt be amortized over long periods (10 to 20 years) to help minimize annual debt repayments and reduce the necessity to increase

tariffs. The availability of long-term debt is, however, limited by the political, regulatory, and credit risks associated with water and sanitation projects in developing countries. For example, in many developing countries financial markets are not developed sufficiently to provide long-term lending. Consequently, foreign sources with associated currency risk must be tapped.

For the projects examined in this study, these tensions have led to the following outcomes (table 7):

- A high initial debt to equity ratio, with debt constituting 50–85 percent of the financing (the English and Welsh companies have a much lower debt ratio because of debt write down at the time of privatization and “green dowries”)
- Maturities ranging from about 7 years at the lower end to 15–20 years in the more advanced, higher credit-rated countries
- Much of the debt financing in the lower credit-rated countries coming from multilateral or export credit agencies (domestic financing is restricted to the higher credit-rated countries)
- Significant government backing through payment and other obligations in the lower-rated countries.

### *Sources of debt*

In countries with weaker sovereign credits, financing has been provided by multilateral institutions and export credit agencies (see box 5). These are the only agencies that are in a position to accept political and regulatory risk and hence provide the longer tenor lending at reasonable rates required for water and sanitation projects. The prominence of the export credit agency is somewhat surprising. The expectation had been that export credit agencies would be less important in water and sanitation projects than in power projects because of the limited imported content of the investment in water and sanitation. However, the Izmit, Turkey, example shows that export credit agency funding may be sought even for construction financing.

The fact that little financing of the water and sewerage sector has been provided by the capital market indicates that individual investors are not in a position to mitigate the risks involved. Projects can be expected to access longer-term debt instruments and capital markets as the level and predictability of cash flows to support debt service becomes more stable and certain. The English and Welsh companies have drawn on a variety of sources, including the bond markets. The low-risk profile of more mature utilities is indicated by the fact that the 24-year bond issue Anglian Water floated in 1990 was priced at just 53 basis points over U.K. Treasury gilts due November 2006. The English and Welsh companies have also taken advantage of low-cost loans from the European Investment Bank (EIB).<sup>4</sup>

### *Sources of equity*

Although debt is generally cheaper than equity, a long-term equity stake by the sponsor (who is sometimes also the operator) ensures that management does not have a short-term bias and that cash flow growth creates capital appreciation. Equity also reduces the burden on the cash flow required to support debt service payments, which can be especially important in a project’s early development phase.

Equity has been provided largely from the established water and sanitation companies that have sponsored and developed projects in the sector. Although the number of large water developers is small (with the French, English, and Welsh companies dominating the market), barriers to entry are low, suggesting that fears over the lack of competition may be unwarranted. Domestic, private engineering and development companies in countries such as Malaysia and Mexico have begun to participate in the sector, and companies in other utility sectors, such as power distribution, are investigating opportunities in the sector.

Lenders like to see sponsors achieve a reasonable return on their investment to provide an adequate incentive to maintain support for the project, at least throughout the duration of the loans. In addition, the lower priority claims

of equity investors in a project's revenues means that by absorbing unanticipated shortfalls in revenue, equity holders partially shield lenders. In full utility concession projects and privately owned utility companies, internal cash generation can provide an important source of equity that can be used to finance investment.

To compensate for greater country and political risks in most developing country projects, the required returns are likely to be significantly higher than returns in industrial countries and closer to those obtained in other infrastructure sectors. Baughman and Buresch (1994) found that, for a sample of power projects in Asia and Latin America, the estimated equity return was 18–25 percent. Fishbein and Babbar (1996) found that investors in privately financed toll roads expect annual returns of 15–30 percent.

TABLE 3

**Risk and cash flow profiles of alternative privatization mechanisms**

Indicator	O & M contract	Lease contract	BOT concession	Full utility concession	Asset sale
Time horizon	2–5 years	10 years	10–20 years	20–30 years	In perpetuity
Customer	Government	Retail customers	Single buyer/ government	Retail customers	Retail customers
Cash flow profile	Fixed-fee for service paid directly by government	O & M fee paid directly from retail consumers and thus subject to market risk	Post-construction purchase contract, typically with a government utility	Subject to market and regulatory risk	Subject to market and regulatory risk
Security interest	Not relevant	Right to part of cash flows generated by assets; no right to own or pledge assets	Right to cash flows generated by assets; usually no right to own or pledge assets	Right to cash flows generated by assets; usually no right to own or pledge assets	Ownership rights to pledge as security; shares are tradable
Construction risk	None	Little	High	Medium	Low
Operations risk	Low	Medium	High	High	High
Regulatory risk	None	Medium	Low	High	Very high

TABLE 4

**Types of risks and mitigation mechanisms**

Risk	Mitigation mechanism
Market or customer risk	<ul style="list-style-type: none"> <li>• Independent tariff and demand studies</li> <li>• Right to cut off service</li> <li>• Utility combinations or regionalization (project bundling)</li> <li>• Loan covenants (debt service coverage ratios)</li> </ul>
Offtake or nonpayment risk	<ul style="list-style-type: none"> <li>• Take-or-pay contract with two-part tariff</li> <li>• Credit support (guarantees)</li> </ul>
Construction/ completion risk	<ul style="list-style-type: none"> <li>• Turnkey contracts with performance bonds, liquidated damages, and insurance</li> <li>• Selection of reputable firms, recourse to sponsors' balance sheet during construction</li> </ul>
Performance/ operational risk	<ul style="list-style-type: none"> <li>• Performance-based operation, maintenance contracts</li> <li>• Long-term ownership interest</li> <li>• Selection of reputable operators</li> </ul>
Currency risk	<ul style="list-style-type: none"> <li>• Indexed tariffs</li> <li>• Debt service payment escrow accounts</li> </ul>
Regulatory risk	<ul style="list-style-type: none"> <li>• Credible concession agreement</li> <li>• Independent regulatory authority</li> <li>• Fair arbitration procedures</li> <li>• Partial risk guarantees</li> </ul>



- Political risk insurance

TABLE 5

**Mechanisms used to mitigate market risk**

Project	Market risk faced by private operator	Mitigation mechanism
BOT water treatment/Izmit, Turkey	Payment risk	<ul style="list-style-type: none"> <li>• Government of Turkey guarantees Izmit payments</li> <li>• Take-or-pay contract</li> </ul>
BOT wastewater treatment/ Chihuahua, and Puerto Vallarta, Mexico	Payment risk	<ul style="list-style-type: none"> <li>• Take-or-pay contract with debt service escrow accounts</li> <li>• Line of credit from Banobras</li> </ul>
BOO water treatment/Sydney, Australia	Payment risk	<ul style="list-style-type: none"> <li>• State government guarantee of payments by Sydney Water Corporation</li> </ul>
BOT water treatment/Johor, Malaysia	Payment risk	<ul style="list-style-type: none"> <li>• Strong credit of municipal water authority</li> <li>• Two-part tariff</li> <li>• Immediate cash flow availability</li> <li>• Phased capacity additions</li> </ul>
Water supply lease contract/Guinea	Demand and payment risk	<ul style="list-style-type: none"> <li>• Phasing in of higher tariffs, with declining government subsidies</li> <li>• Disconnection for nonpayment</li> </ul>
National sewerage concession/Malaysia	Demand and payment risk	<ul style="list-style-type: none"> <li>• Minimum guaranteed return</li> </ul>
Water and sewerage concession/ Buenos Aires, Argentina	Demand and payment risk	<ul style="list-style-type: none"> <li>• Tariff adjustment process</li> <li>• Guarantee of payment by government customers</li> <li>• Disconnection for nonpayment</li> </ul>
Water and sewerage asset ownership/ England and Wales	Demand and payment risk	<ul style="list-style-type: none"> <li>• Five-year tariff adjustment process by independent regulator</li> <li>• Disconnection for nonpayment</li> </ul>

**Box 4**

**Mitigating the risk of nonpayment through credit enhancement in Mexico**

Because the water and sanitation sector is fragmented, buyers of bulk water and wastewater treatment are often small, local government utilities without track records for collecting user fees and making reliable payments. To mitigate the risk of nonpayment, lenders look for some form of credit enhancement, such as a government guarantee of contractual performance, direct assignment of part of the buyer’s revenue stream, or trust funds and escrow accounts in which several months of debt service are deposited.

In Mexico, where the need for capital to upgrade, rehabilitate, and extend the water and wastewater sector is significant, the federal government is devolving financing responsibility to the local governments, which are exploring different mechanisms with which to mitigate the nonpayment risk stemming from the financial weakness of the local water authorities.

The Mexican government has given authority to its public works bank, Banobras, to provide credit enhancement to municipal projects. In 1994 Banobras played an instrumental role in closing a \$17 million BOT water treatment plant in Chihuahua by providing a line of credit that was supported by a pledge by the State of Chihuahua to share its tax revenues.

In addition, to ensure that monies are appropriately allocated to items of cost and debt service, local authorities use Fidecomiscos (trust funds) to handle incoming and outgoing funds. The payments to the contractor are deposited in the Fidecomisco, thereby guaranteeing the banks financing the project that repayments will be made from the income from the project. Bank loans are also handled through the trust.

The ultimate form of security against nonpayment risk, especially in the case of a default by the offtaker, is a solid termination clause. In the power sector, sponsors may negotiate a “put” requiring that, in the event of termination, the offtaker will “buy out” the sponsors for an amount corresponding to the discounted cash flow expected to be generated during the remainder of the term of the power purchase agreement.

TABLE 6

**Mitigating regulatory and political risks**

Project site	Mitigation mechanism
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Malaysia (national sewerage project)	<ul style="list-style-type: none"> <li>Local company equity participation</li> <li>Tariff review and adjustments</li> <li>Government commitment to privatization</li> </ul>
Buenos Aires, Argentina	<ul style="list-style-type: none"> <li>Compensation of concessionaire in event of early termination</li> <li>Independent regulatory authority</li> <li>IFC and local investor participation</li> <li>Transparent tariff adjustment process</li> </ul>
Izmit, Turkey	<ul style="list-style-type: none"> <li>Significant export credit agency (ECA) participation</li> <li>Commitment by the Government of Turkey and credit support</li> </ul>
Chihuahua and Puerto Vallarta, Mexico	<ul style="list-style-type: none"> <li>Municipal grant funding (Chihuahua)</li> <li>Local investors/developers equity participation</li> <li>Banobras credit support</li> <li>IFC participation (Puerto Vallarta)</li> </ul>
Johor, Malaysia	<ul style="list-style-type: none"> <li>Federal and state government commitment to privatization</li> <li>Local developer equity participation</li> </ul>
Sydney, Australia	<ul style="list-style-type: none"> <li>Credible BOO concession agreement</li> <li>Local developer participation</li> </ul>
•	Fair and competent judiciary
England and Wales	<ul style="list-style-type: none"> <li>Disbursed shareholding by local investors</li> <li>Independent regulatory authority</li> <li>Reputable judiciary</li> <li>Moving to a multi-utility structure</li> </ul>

TABLE 7

### Summary of project financing

Project site	Project cost	Debt/equity	Country rating	Source and maturity of debt
Malaysia	\$2.4 billion (about \$500 million in first two years)	75/25	A+	Government soft loans (for length of concession)
Buenos Aires, Argentina	\$4.0 billion (\$300 million for first 2 years)	60/40	BB-	10-year IFC A-loan; 12-year IFC B-loan (recourse to Argentine government in event of early termination)
Izmit, Turkey	\$800 million	85/15	B	13-year export credit agency loans, 7-year MITI loan, 7-year commercial bank loan (recourse to Turkish government)
Chihuahua, Mexico	\$17 million	53/15/32 (debt/equity/grant); debt in US\$	BB	8.5-year commercial bank loan with limited recourse to Banobras
Johor, Malaysia	\$284 million	50/50	A+	10-year project finance loan from Public Bank Bhd (nonrecourse)
Sydney, Australia	A\$230 million	80/20	AAA	15-year commercial loans; state government stands behind Sidney Water Corporation payment
England and Wales	\$5.24 billion	25/75	AAA	Variety of borrowing sources

## Box 5

### Easing the policy transition with partial risk guarantees

Multilateral development banks have recently reemphasized their guarantee powers to support private projects. The focus has been on power projects, although several water projects are potential candidates for these guarantees, which reinforce a government's contractual agreements. Multilateral development bank guarantees can cover the following commitments:

- Payments in the event of early termination of the concession contract
- Payments to cover the subsidy element of consumer bills
- Payments to cover expenses of severance pay and labor retraining
- Timely delivery of civil works and other structures

- Application of the agreed-upon tariff determination process
- Disconnection of nonpaying customers
- Foreign exchange convertibility

The World Bank requires a counterguarantee from the host national government before it guarantees a government's commitments. Other multilateral development banks (the Asian Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank) do not always require such counterguarantees.

Other sources of international political risk guarantees include the Overseas Private Investment Corporation (OPIC) and the Multilateral Investment Guarantee Agency (MIGA), which provide cover against currency transfer, expropriation, and war and civil disturbance. Political risk insurance has typically not been available from private sources for large infrastructure projects. That may be changing, however, as demand for emerging market exposure is growing. Force majeure events can also include legislation and rulings made by a government or judicial authority, unanticipated pollution, power failure, and raw water shortages.

## Beyond Project Finance

Project finance is a costly and complex process of identifying and evaluating risks associated with future cash flows of projects.<sup>5</sup> The long lead times and high transactions costs associated with project finance are likely to make it less attractive than finance raised on the balance sheets of larger companies. Before capital markets can be accessed, however, the cost of assessing, allocating, and mitigating project-related risks must decline. Once these costs fall, the pool of prospective investors will increase, and the sector will be able to tap a broader group of intermediaries, including insurance companies and pension funds, which have long-term fixed rate liabilities. Corporate finance simplifies this transition to capital market financing, since the risk of a project's debt is absorbed, in part, by other corporate activities. Financing project debt from the balance sheet, however, exposes a company to significant risk and thus requires a strong and large balance sheet. Partly to shield a company's balance sheet, innovative financial instruments, such as equity funds, are being developed. These infrastructure equity funds provide a means by which developers can raise capital and investors can participate in the emerging market for financing infrastructure projects. To infrastructure developers, funds can be particularly attractive because they can leverage their contributions with that of other investors. For investors, equity funds mitigate project and country risk by creating a portfolio of projects under one company.

The French water company, Lyonnaise des Eaux, introduced an Asia water fund in 1995. Contributors to the fund include the All State Insurance Company, the Employees Provident Fund Board of Malaysia, and the Lend Lease Corporation of Australia. The \$300-million fund will refinance the equity of the original sponsors, thus allowing sponsor equity to be conserved for development. Investors in the fund expect to receive steady utility-like returns and the potential for a significant gain in the event that the fund or a portion of it is publicly listed. A Latin American fund is also under consideration.

## Corporate Finance

Balance sheet financing may be particularly attractive for overcoming some of the obstacles to financing water and wastewater facilities on a project basis. The nature of the risks in the sector (the small size of projects, the lack of creditworthiness of local governments, uncertainty over asset valuation, the fact that revenues are in domestic currency and local capital markets are undeveloped) makes raising long-term project finance at reasonable rates especially difficult. Reducing the reliance on limited-recourse debt, especially in a project's early high-risk development years, could lower project costs.

As in other sectors, projects in water and sanitation have been financed with some recourse to a sponsor's balance sheet. Corporate sponsors have provided protection in the Buenos Aires project, for example. But recourse to project sponsors goes only part of the way, since, unlike in the power sector, relatively few highly capitalized companies operate in the water and sanitation sector, and domestic regulations have limited the ability of the large English and Welsh companies to shoulder international risks.<sup>6</sup>

Hence, increasing balance sheet financing may require significant industry restructuring, such as consolidating ownership and operation of regional water utilities or encouraging the integration of different utility sectors. Malaysia's approach to bundling the country's entire sewerage system under one concession is an example of project pooling. Although that project is experiencing tariff collection problems and has forgone the benefits of comparative competition that are achieved when systems operate side by side, the approach secured revenue streams for the project sponsor with which to finance a large number of small investments that would not have been commercially viable on their own.

Financial and operational sustainability requires a utility to finance investments from internal cash and long-term bond issues. Water projects are in a position to use these sources of finance effectively. Once established, water projects can have stable revenues, which permit not only internal financing but also access to a much broader class of

investors through bond issues. Of developing country projects, only Aguas Argentinas has moved significantly in this direction: internal cash generation accounted for 9 percent of financing in the first three years and was expected to rise to 30 percent in the subsequent three.

The use of bond financing by privately financed water projects and utilities is relatively new. In most developing countries both the general development of bond markets and the development of economically viable water utilities is at an earlier stage. It is likely that just as utilities will benefit from bond market development, the growth of strong utilities will spur the growth of domestic bond markets.

## **Overcoming the Disadvantage of Small Size: The Role of the Public Sector**

On average water and wastewater investments tend to be much smaller than in other infrastructure sectors because of the small fragmented size of the market. Municipalities are in charge of water and sanitation, and investments in facilities reflect demand within their jurisdictions. Even where large investments are expected, they are spread out over time. This pattern of small, incremental investments contrasts with the construction of power plants and transportation projects (toll roads, ports, airports), where large investments are typically made over a short period of time.

The relatively small scale of water and wastewater infrastructure projects is an obstacle to attracting finance. Potable water and sewage treatment facilities generate little interest from commercial banks because the projects are small, their credit is unrated (or the credit of their sponsor is weak), and transactions cost are proportionately higher than for large projects. For banks the cost of due diligence is about the same for large and small projects; since the fees earned are greater for larger projects, there exists a natural bias against small projects. Overall, the transactions costs of a project—the legal, consulting, and financial costs of structuring a small project—may be as high as those for a larger project (Klein, So, and Shin 1996).

To address the scale-related finance gap, small projects may have to rely on greater equity commitments and credit enhancements by third parties and look for creative financial structuring techniques, such as bundling of projects. Governments and official financial agencies, such as the EBRD's private multi-project financing facility and state revolving funds, can also provide financing.

Formation of multi-utilities may also help overcome the small scale problem. By combining, different utility sectors may be able to achieve the necessary balance sheet size and credit strength (through diversity) to attract long-term private financing. Convergence or bundling of utility services creates opportunities to realize the following economic benefits:

- Cost savings from rationalizing two or more complementary cost bases, especially in customer services (meter reading and tariff collection) and finance and administration
- Diversification of regulatory risk
- Provision of total utility solutions for customers
- Transfer of important strategic and marketing knowledge from a deregulated business to a regulated company.

The United Kingdom has been the leader in the formation of multi-utilities. United Utilities and Scottish Power, two of the three British multi-utilities, provide electric generation/distribution, water and sanitation, gas distribution, and telecommunication services. The convergence of utility services can be expected to bring about far-reaching organizational and regulatory changes. For example, British companies have already created facilities management companies to handle ancillary overlapping services and serve the broader market, and industry regulators have demanded strict ring fencing of the core utilities to make the ownership structure transparent. Financial changes are also expected, as companies take on greater debt to buy assets, and new services may be exposed to competitive markets.

Multi-utilities are playing a growing role in developing countries. Combined gas and water utilities exist in Slovenia and Argentina. In Côte d'Ivoire the project company developing the water supply concession went on to develop the electricity distribution system and a power generation project. This multi-utility approach is being adopted in the concessions recently awarded in Casablanca and Gabon and is being looked at for water and power projects in Morocco and the Congo. The implications for the concentration of monopoly power are a concern, however.

## Conclusions

The experience of the private sector in the water and sanitation sector has been a positive one, in which the private sector has successfully demonstrated its ability to provide water and sanitation services with increased efficiency and at affordable rates within different country, regulatory, and contractual contexts. The growing worldwide shortage of water, serious problems with access to clean drinking water, and the escalating requirements for waste treatment can be expected to prompt increasingly bold experiments with private involvement in the water and sanitation sector.

While firm conclusions are premature in what is yet an incipient movement, certain lessons emerge for successful private sector involvement in the water and sanitation sector.

## Commitment and Strategy

- Governments must strongly commit to private participation, both financially and politically.
- A strategic sector view that sets a sustainable utility structure as its goal (that is, goes beyond discrete BOT/BOO projects) must be adopted in the future. Full utility concessions and asset sales, which offer the broadest scope for operational and financial improvements, can address systemwide problems.
- Where full utility concessions or asset sales are not feasible, the operation and financing of utilities should be separated from their regulation through corporatization, and operations and cash flow should be improved through operations and maintenance and lease contracts.

## Financing Responsibilities

- In the transition from government to private financing, government support is likely to continue through various types of credit enhancement and, in some cases, direct subsidies.
- In the long run, measures to develop financing methods for several small water and sanitation projects under the jurisdiction of provincial and municipal governments will be required.
- Forms of credit pooling and enhancement should be explored.

## Contracting and Regulation

- When possible, transparent competitive tendering should be used to generate information on asset values, tariff levels, and qualified operators.
- Mechanisms for adjusting tariffs must be transparent and predictable, and they must provide incentives for increased efficiency.
- Although gains in efficiency can be expected as a result of private participation, in most countries it is realistic to expect and plan for price increases if utilities are to expand systems and meet increasingly stringent environmental standards.
- Contracts must spell out the private sector's obligations and clearly identify the penalties for nonperformance. Security of contracts should be provided to facilitate financing.
- A contractual and regulatory structure that minimizes uncertainty and provides flexibility in renegotiation and operational autonomy for the operators—while ensuring that environmental and health standards are met—must be established.

## Notes

1. In principle, capital market financing can occur earlier. Its importance is likely to grow substantially, however, once a track record of revenues is established.

2. Everything else equal, projects that face greater market risk will have less capacity to service debt and thus lower debt-equity ratios. Through loan covenants lenders protect their residual claims by requiring, for example, that projects meet minimum debt service coverage ratios or that cash dividends not be disbursed if the current ratio falls below a certain level.

3. The economic interest of each party should be borne in mind when allocating risks and responsibilities. For example, construction companies are generally less concerned with the long-term operating performance of a facility than with the opportunity to take out construction profits from a project. Turnkey contracts and the need to maintain a reputation for high-quality work act to align the construction company's incentives with those of the sponsor. To prevent the distortion of incentives that may occur if a construction contractor is also a sponsor, the government may require that the sponsor hold a significant stake in the project over the life of the concession (as it did in the Aguas Argentinas concession).

4. The European Investment Bank (EIB) is the largest infrastructure financing institution in Europe. From 1991 to 1995 the EIB lent ECU 84 billion in 15 member states in the European Union and 11 Central and Eastern European countries. The bank is a shareholder in the EBRD and the European Investment Fund, with which it also cofinances. It raises funds by issuing bonds on the capital markets, where it is the world's largest nonsovereign borrower (*Project Finance International* 1996).

5. The prefinancial closure cost of preparing a limited recourse financing for a power project ranges between \$4 million and \$8 million, with legal costs representing about half of these costs (Churchill 1995).

6. The regulated English and Welsh water companies will have difficulty exposing their balance sheets to international project risk.



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