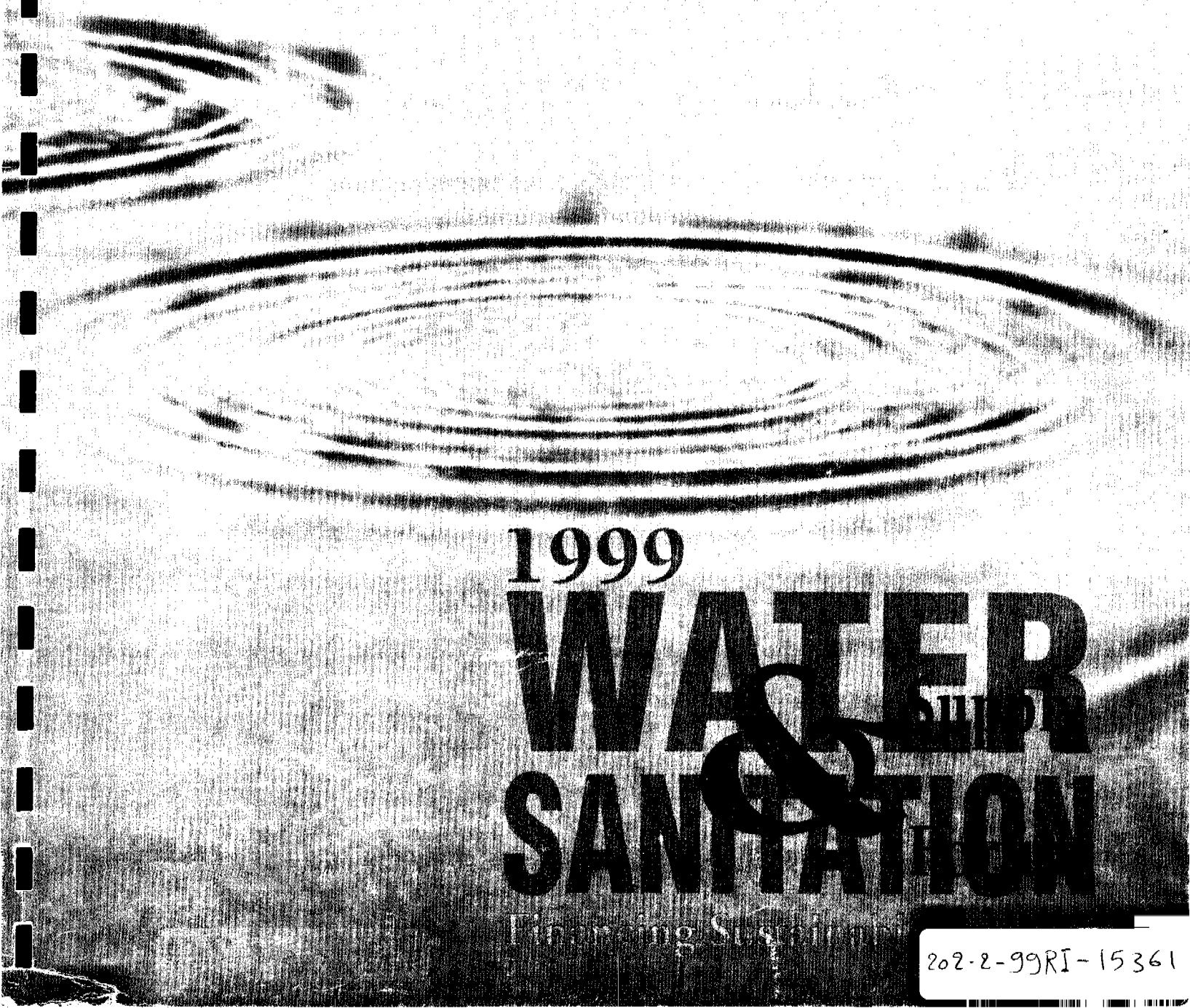
Managing Risk: The Perspective of the Private Operator and a Response from the Owner's Perspective



Risk Analysis And Mitigation: The Perspective of the Private Operator and a Response From the Owner's Perspective

Moderators: *Klas Ringskog, Principal Water Specialist, Operations Evaluation Department, The World Bank*

Jamal Saghir, Sector Leader, Middle East and North Africa Infrastructure Development Group, The World Bank

Speakers: *Bernard Poignant, International Project Finance Director, Generale des Eaux (France)*

Didier Retali, Vice President – Projects, Suez Lyonnaise des Eaux (Philippines)

Grahame Sweetsur, Director – Structured & Project Finance, Biwater Plc (Mexico)

Judy Wilson, Partner, Blakes, Cassels & Graydon

Mamadou DIA, Deputy General Managing Director, Senegalise des Eaux (Senegal)

J.L. Guyot, Advisor to the C.E.O., SAUR International (France)

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Introductory Notes

One of the principal beneficiaries of the push for private sector participation has been our understanding of risks and their mitigation. Where in the past Bank and client staff analyzed risks because our internal directives obliged us to do so, the arrival of private operators on the scene has been momentous. Here is a contractual party that stands to lose both money and reputation on each particular deal and who is acutely aware of what can go wrong.

The private operators have also learned from their growing international exposure. Some contracts and concessions have had a dismal end. Others have ended with no pain, but with no gain either.

As our insight grows with the number of Private Sector Participation (PSP) deals we have come to understand the great contribution that World Bank Group staff can make to serve as honest brokers between our client countries and the private operators. Bank staff are often the party that is credible in the eyes of our client governments since we have a more balanced perspective of the pros and cons of private sector participation and work closely with governments on defining the optimal strategy and private sector scheme that fits the reality and the development objectives of the sector. We are regularly drafting terms-of-reference for the preparatory studies, reviewing and commenting on these studies at length and we are the ones giving advice to our clients in the procurement of private operators.

In order for Bank staff to do what our clients expect from us we need to become more familiar with risks under our water supply and wastewater projects, and understand the private sector perspective of project risk issues. We also need to comprehend what risks private operators are able and willing to take and which they simply cannot assume. Of course this could affect the design and scope of certain schemes.

On one hand, our clients wish to shift more risk to private operators since they know that performance will improve as a result. But on the other hand, shifting too much risk to intended private operators will create the danger of a lack of bidders for concessions, lease contracts, or whatever. The bidding for the Caracas concession in 1992, for example, produced no bids because the risks were too high; and in other bids only one or two qualified operators submitted bids in the end. Such experiences do not improve the perception of private sector participation in the eyes of wary government officials.

Government guarantees are almost certainly needed in order to reduce perceptions of risk. Infrastructure provision does not take place in isolation; the success of a project depends on a wide variety of factors outside the control of potential investors or operators, ranging from government macroeconomic or sectoral policies, to the reliability of purchasers of the service to be provided. Given the uncertainties involved, effective guarantees are a powerful factor in encouraging private participation.

The basic approach to risk management should be based on the principle that the party best able to manage a risk at least cost should mitigate it. It may be necessary to unbundle the various risks so as to determine which participant is best placed to manage which risks at the lowest cost, and how the cost of risk mitigation can be shared equitably.

Our panel of speakers for this session is impressive. (It comprises four of the major private operators, who together have decades of experience managing water supply and

sewerage systems in developing countries). We have requested them to share with us how they size up a prospective operating contract and how they go about protecting themselves against the risks and uncertainty that are part and parcel of our water supply and sewerage projects.

In particular, we have asked them to talk about the kind of risk analysis that they go through before investing in the costly preparation of a bid. We have also asked them to explain what kind of risks they feel comfortable assuming and what kind they are unable or categorically unwilling to take on. Additionally, we have asked that they illustrate their analysis with special case studies in order to make it less academic and more concrete. In order to reflect the great variety of our countries, we will have regional presentations from: Africa, East Asia, and Latin America. We will also have the benefit of learning from the three big French water supply operators – Vivendi, Lyonnaise des Eaux, and SAUR – of their respective projects in China, the Philippines and Africa. We will also have an in-depth illustration of financial risk from Mr. Graham Sweetsur from the Biwater wastewater BOOT in Puerto Vallarta in Mexico.

We will also have the benefit and pleasure of listening to Ms. Judy Wilson, from the Canadian legal firm Blakes, Cassels and Graydon. Ms. Wilson has extensive experience in helping a number of client countries and municipalities defining PSP schemes, analyzing the risks from PSP options, and assessing how risks can best be mitigated and allocated so that the party that can control a particular risk at the least cost will be asked to assume it. In doing so, Ms. Wilson will provide the owner's perspective.

Klas Ringskog, Jamal Saghir
Session Leaders

Biographies

KLAS RINGSKOG

Mr. Ringskog is a Principal Water Specialist in the World Bank. He is a civil engineer and economist and has been with the World Bank since 1970 in various capacities related to infrastructure lending. He has taken a number of leaves-of-absence, most recently from 1988-1993 to serve as Senior Vice President of the Nordic Investment Bank analyzing and managing country, corporate and project risk. He has extensive experience from working with private sector participation including regulation in the water supply and wastewater sector in a number of countries.

Recent publications include *Private Sector Participation in Water Supply and Sanitation in Latin America* (Idelovitch and Ringskog, World Bank, 1995); *Wastewater Treatment in Latin America - Old and New Options* (Idelovitch and Ringskog, World Bank, 1997); and *Water Markets in the Americas* (Simpson and Ringskog, World Bank, 1997).

JAMAL SAGHIR

Mr. Jamal Saghir is a Sector Leader in the Infrastructure Development Group, Middle East and North Africa Region. He joined the World Bank in 1990 as a Financial Officer in the Private Sector Financial Operations Group of the Co financing and Financial Advisory Services. In 1994, he joined the Middle East Country Department as a Senior Private Sector Development Specialist in the Industry and Energy Operations Division. He transferred to the Private Sector Development and Infrastructure Division in 1995 where he was promoted to Principal Private Sector Development Specialist in 1997. He transferred to the Infrastructure Development Group in the 1997 where he was promoted to the position of Sector Leader in 1998 covering the field of Urban Water and Sanitation

Prior to joining the World Bank, Mr. Saghir served as resident advisor to the Prime Ministry in Tunisia (1988-1990) and was responsible for managing a major USAID-funded program in Tunisia to privatize and restructure state-owned enterprises. From 1985-1988, Mr. Saghir held the positions of Economic Adviser and Chief of Staff to the Associate Minister of Finance and Privatization in the Government of Quebec in Canada.

BERNARD POIGNANT

Mr. Poignant is the head of International Affairs at Lazard Freres et Cie in Paris, France. He has been in charge of international placement, syndication, pricing allocation in BNP, UAP, and Renault privatization. In Indonesia, he was an advisor of the Indonesian Government for the privatization of Indosat, and PT Telkom Privatization. In Hungary, he was an advisor to MOL privatization and Co-Global coordinator for the IPO; MATEL and Cie Generale des Eaux negotiations.

In Poland, he had various advisory roles in Ciech; Nafta Polska; advisor for a convertible bond issue for Stalexport; and acted as advisor for an equity issue for Kredytbank. In Croatia, he was involved in negotiation for privatization of Pliva and Zagrebacka Banka.

DIDIER RETALI

Mr. Retali began work for the Ministry of Industry in France. He was in charge of a regional pollution control department and, subsequently, was in charge of the natural gas sector. He joined Lyonnaise des Eaux in 1989. He was Executive Director of the Macao Water Supply Company from 1991 to 1994 and Director of Lyonnaise des Eaux for Hong Kong, Macao and China from 1993 to 1994. In 1994 he became Vice President of International Projects.

GRAHAME SWEETSUR

Mr. Sweetsur is the Director of Stroctured & Project Finance of Biwater Plc. Following an initial career in international management consultancy with one of Europe's largest integrated consulting companies, Mr. Sweetsur embarked upon a second career in international finance initially with the First National Bank of Chicago and then with UK Project Finance, a specialist export and project finance company.

In 1992 he joined Biwater Plc, where he has global responsibility for the structuring and arranging of finance for a wide range of private sector water and waste water projects, including build-own-operate, concessions and long term management contracts.

JEAN-LUC GUYOT

Mr. Guyot is an adviser to the C.E.O. of SAUR INTERNATIONAL. He follows up special projects where the use of multi-skills and multicultural expertise is essential. He is also qualified as an Engineer from Ecole Centrale de Paris. Most recently, he was the Managing Director of Sigesa in Italy (1996-1998).

After two-years experience in Algeria, as a civil engineer, he joined the SAUR Group in 1977. He carried out various water and wastewater projects in France until 1988, heading a regional branch for five years.

Then, he moved to SAUR INTERNATIONAL where he has supervised operations in Canada (1989). Based later in London, he initially launched activities of hydraulic engineering as Dynamco (1990 – 1991) and, subsequently, was involved in refuse collection and facilities management as Ecovert (1992 – 1995).

JUDY WILSON

Judy Wilson is a lawyer with Blake, Cassels & Graydon, one of the largest law firms in Canada. She has had a career both as a lawyer and as an operator of municipal infrastructure systems. She has extensive professional experience in municipal utility management, infrastructure management, private and public sector roles in the provision of traditional public services and in public tender and public proposal processes. She has provided extensive advisory services to international, national, provincial and municipal governments on a wide range of infrastructure issues.

Risk Analysis and Mitigation: The perspective of the Private Operator
Case Studies: Financial Risks/Puerto Vallarta, Mexico

By Grahame Sweetsur

This paper looks at the experiences of Biwater when it undertook one of the world's first privately financed BOT waste water projects in Puerto Vallarta on Mexico's Pacific Coast.

Obviously in projects of this nature there are many contractual, technical, political and commercial risks that the sponsor has to identify and hedge or accept as part of the business of doing business in any part of the world. In emerging markets some of the risk issues require greater evaluation and mitigation than developed markets. This paper concentrates on some of the commercial risks that we identified and how we hedged them and how we might have hedged them if circumstances had been different.

Biwater first became interested in Mexico in the late 80's following an extensive review of the opportunities for the private sector development of the water and waste water infrastructure. At this time Mexico was exhibiting sustained economic growth with low inflation and stability in the value of the Peso – all prerequisites for making an investment decision in an emerging market.

The background to Biwater's decision to select Puerto Vallarta as our first project in Mexico was based upon the following factors:

- **Tourism**

Puerto Vallarta has been a very popular tourist destination for many years for American and Canadian holidaymakers. With the opening up of long haul holiday markets with the dramatic fall in airline fares and charter rates, Puerto Vallarta was rapidly featuring in European holiday brochures and in the last few years European tourists have been the fastest growing segment of tourism to Puerto Vallarta. Tourism and all its related activities is therefore the principal driver for the local economy.

- **Affordability**

The international hotels were able to pay an economic rate for the provision of potable water and the treatment of waste water.

- **Efficiency**

SEAPAL, the local municipal water authority is one of the most efficient operators in Mexico.

- **Need**

However it was faced with an increasing problem of discharges of untreated or partially treated waste water in to Banderas Bay which was having an impact on tourism. SEAPAL was resolved to act but was unable to finance both the construction of the sewerage system expansion as well as a waste water treatment plant.

- **The Solution**

SEAPAL realised that they would need to involve the private sector in resolving this problem and they quickly made the decision to invite the private sector to finance, build and operate the treatment facility whilst they took responsibility for installing the sewerage systems.

- **Timing**

However when we first identified this project in 1989 we realised that it would take about two years to develop the project, two years to construct it followed by a fifteen year operating period; almost a twenty year project horizon and during this period there could be four or five presidential terms and two or more economic cycles. We obviously realised that at any time during the development and operation of a project the prevailing financial and economic situation is no more than a "snap shot" and cannot be relied upon to remain constant forever.

- **The Project**

The waste water project was conceived as a BOT project undertaking the treatment of waste water for SEAPAL the local municipal water authority. The project was designed to treat increasing volumes of waste water, initially treating 600 l/sec, increasing after two years to 750 l/sec and finally 1000 l/sec after ten years of operation. The plant was designed with an initial nominal capacity of 750 l/sec and a peak flow capacity in excess of 2500 l/sec. The initial capacity is to be expanded in 2005 to reach the maximum design capacity.

The total investment in the facilities was US$ 33.2 million including interest charges during construction, finance and legal charges and working capital. The project was constructed with local Mexican contractors and the principal plant and equipment was imported. The project costs split down almost equally between Peso costs and US Dollar (Sterling) costs.

- **Funding alternatives**

The initial questions regarding how the project was to funded was one which faces all project developers in emerging markets:-

1. ***Is there sufficient liquidity in the local market to fund the entire project costs in Peso,***
2. ***If there is sufficient liquidity what is the cost of domestic funding and what are the maximum loan tenors available.***
3. ***Is there a derivatives market which will allow the hedging of the foreign exchange exposure created by having the entire income denominated in Peso and the liabilities denominated partially in US Dollars.***
4. ***Will the client accept an adjustment to the Tariff to take in to account changes in the value of the Peso, and***
5. ***Guarantee of payment of the Tariff.***

During the detailed engineering of the project a decision was made early on during this process that as the long term operator of the facility Biwater wanted to ensure that we had the best and most reliable equipment installed in the plant. This led us to the decision to import the principal items of mechanical and electrical plant and equipment.

We were therefore forced to arrange a part of the funding in US Dollars. We looked at arranging the equivalent Peso amount and converting at the spot rate to US Dollars to finance the imported equipment, but still maintaining a Peso denominated liability. Whist this would have hedged our foreign exchange exposure it created an unacceptable Peso interest exposure as fixed rate Peso finance was not available. Also the higher cost of Peso funding made project much less viable.

- **Hedging**

During negotiations with the client of the BOT contract it became very clear that he was not prepared to accept any adjustment of the Tariff to take in to account changes in the value of the Peso.

In the absence of any long term derivatives market that would have allowed us to hedge our foreign exchange exposure and no possibility of linking the Tariff to the value of the Peso we had to look for other methods to overcome this problem.

We spent a lot of time analysing the problem and seeking possible solutions, we looked for an artificial foreign exchange hedge. Time was spent on analysing, and becoming comfortable with, the correlation between Peso devaluation and inflation and Peso interest rates and inflation. Our historic analysis showed that there was a very high correlation between devaluation and inflation, sufficiently so to convince us that if we adjusted our Tariff in-line with Mexican inflation than it would accommodate the impact in downward changes to the value of the Peso and to changes in Peso interest rates. It was also recognised that whilst interest rates are subject to short term fluctuations, and are often used to protect the value of the Peso, the value of the Peso over the long term was tending to devalue.

Our analysis also showed that the change in the value of the Peso took some time to be reflected in a change in Mexican inflation rates. This was typically three to five months. Any change in the value of

the Peso would ultimately be reflected in a change in Mexican inflation rates. However this could result in a short term cash flow problem. We therefore had to build in a "cushion" to soften the blow of a dramatic change in the value of the Peso and we allowed for a six month debt service reserve that was to be established from the project's cash flow.

Having got ourselves comfortable with the economic risks, and this is now the **beginning** of 1994, we turned to addressing the principal commercial risk of non-payment or partial payment of the Tariff.

- **Contractual Performance**

Whilst SEAPAL was one of the most technically and commercially efficient public sector water companies in Mexico, Biwater was obviously concerned that the entire success of the project during the operating period was dependent upon:-

1. ***Biwater's ability to operate the facilities to the required standards and meet the operating performance criteria, and***
2. ***SEAPAL's ability to pay for the service to be provided.***

Biwater was confident of its ability to operate the facility to the highest international standards and therefore we were comfortable to accept the liability to make penalty payments if it failed to meet the operational performance criteria over the short term. If Biwater, for whatever reason, was unable to operate the facility to the required standards over the medium to long term, the contract with SEAPAL would not be terminated but Biwater as the operator could be replaced by another operator.

Biwater and the lenders were concerned about SEAPAL's long term ability to pay the Tariff and a Tariff payment security structure was designed to overcome this issue. This comprised an irrevocable revolving letter of credit issued by Banobras in an amount equivalent to six months Tariff. The structure also involved an ability to make attachment to the Federal Tax revenues payable to the State Government in the event that certain conditions were not fulfilled.

- **Funding Plan**

Having satisfied ourselves on our ability to hedge the foreign exchange exposure through the Tariff adjustment formula and having hedged the Tariff payment through the letter of credit we set about finalising the funding for the project.

FUNDING PLAN

FUNDING	*Offshore US$ Million*	*Local (a) US$ Million*	*Total US$ Million*
EQUITY		*8.00*	*8.00*
DEBT			
IFC	*5.00*		*5.00*
-Senior debt	*2.00*		*2.00*
-Subordinated debt			
Biwater			
-Senior debt	*9.90*		*9.90*
Banobras		*8.30*	*8.30*
-Senior debt			
TOTAL	*16.90*	*16.30*	*33.20*

(a) US Dollar equivalent at US$ 1.0 =N$ 3.1

The funding plan matched the construction and equipment supply costs and other project expenditures and we were therefore hedged during the short term construction period but reliant upon our artificial hedge during the operating period.

- **Devaluation of the Peso**

The construction of the project was completed in November 1994 and the commissioning period was about to start with commercial operations scheduled to commence in February 1995 when, in December 1994, the Peso was devalued and allowed to float. The following table shows what happened in the financial markets over the subsequent period:

Date	*Peso/US$ exchange rate*	*Peso Interest rates (Percent)*	*US Dollar interest rates (Percent)*	*Mexican inflation (Percent)*
1995				
January	*5.690*			
February	*5.940*	*48.23*		*8.1%*
March	*6.770*	*77.63*		*5.9%*
April	*5.890*	*94.55*		*8.0%*
May	*6.170*	*78.36*		*4.2%*
June	*6.240*	*50.38*	*9.6250*	*3.2%*
July	*6.100*	*44.92*		*2.0%*
August	*6.255*	*40.60*		*1.7%*
September	*6.385*	*39.66*		*2.0%*
October	*7.060*	*47.46*		*2.1%*
November	*7.525*	*58.87*		*2.5%*
December	*7.680*	*52.35*	*8.8750*	*3.2%*
1996				
March	*7.524*	*43.97*		*8.4%*
June	*7.580*	*38.77*	*8.5625*	*6.4%*
September	*7.535*	*32.68*		*4.4%*
December	*7.882*	*34.58*	*8.6875*	*6.1%*
1997				
March	*7.913*	*24.65*		*5.6%*
June	*7.931*	*24.57*	*8.5000*	*2.9%*
September	*7.767*	*25.19*		*3.1%*
December	*8.065*	*24.70*	*8.8750*	*3.3%*
1998				
March	*8.517*	*25.27*		*5.2%*
June	*8.960*	*25.71*	*8.9375*	*3.0%*
September	*10.250*	*35.27*		*3.6%*
December	*9.900*	*39.03*	*8.6875*	*5.7%*
Total change over period	*73.95%*			*146.51%*

This table shows that the assumptions we made in 1993/94 regarding the possible future course of the Mexican economy unfortunately came true. Whilst there were small short term increases in the value of the Peso the overall trend over the period from the beginning of 1995 to the end of 1998 has shown a reduction in the value of the Peso, with an overall devaluation of the Peso of around 74%. During the same period Peso interest rates have fluctuated widely from a low of 24% to a high of 94% as the Mexican government attempted to control the slide of the Peso by hiking interest rates. Interest was payable on the Mexican loan on a monthly basis so the impact of the increase in the Peso interest rate was felt immediately. The devaluation of the Peso obviously had a major impact on the debt service costs of the US Dollar denominated debt. Fortunately interest payments and principal repayment were made on a semi-annual basis and this gave some time for the Tariff adjustment to take place.

The resultant increase in interest rates could not have happened at a worst time in the project when the debt service costs were at their highest. It was recognised very quickly that the project could not withstand Peso interest rates at this level for too long and mitigation would have to be quickly sought to overcome the problem. This was achieved by negotiating a short term cap in June 1995 on the Peso interest rate and capitalising the difference between the market rate and the capped rate. This alleviated

the worst impact of the hike in the Peso interest rates and gave time to allow the change in Mexican inflation to adjust the Tariff and restore financial equilibrium.

- **Financial equilibrium regained**

We can now look back at the project after it has been in operation for over four years. Peso interest rates have now moderated from the early days of 1995, and whilst they are still higher that were projected when we first undertook the financial projections in 1993 and 1994 the debt has been partially paid down and the impact is reduced. We obviously have to live with the impact of the devalued Peso on the costs of servicing the offshore debt with the value of the Peso having declined by nearly 75%. However as the offshore debt accounts for approximately half the total debt this impact is somewhat mitigated. However over the same period the Mexican inflation rate has increased by over 140%. Therefore our decision to link the Tariff adjustment to Mexican inflation has been vindicated.
This describes our experiences over the past four years in this project. The question remains as to whether we would use the same approach again.

- **The future**

In the ideal world the answer is no, but then we are not operating in the ideal world where currencies and interest rates are stable and we are not faced with the normal economic uncertainties. In some countries the problem can be overcome, for example in Panama where we have been awarded a BOT water supply contract the problem simply does not exist as the currency is effectively the US Dollar and the Tariff is paid in Dollars and the liabilities are in Dollars and the country enjoys similar inflation rates to the US. In some of our Concession projects the problems are different. We have taken over existing operating companies which provides a known cash flow from the beginning of the project and investment takes place over a period of time. In these situations in the Philippines and Indonesia we have been able to finance the costs of refurbishment, rehabilitation and expansion through a combination of local debt finance and the projects existing cash flow. Whilst this has hedged the foreign exchange exposure it has not been able to hedge the interest rate exposure. However operating as we do in these two countries the tariff has been adjusted, with the approval of the regulator, to take in to account the domestic costs of finance.

In other situations the situation is different. For example in India where we have been awarded a very large BOOT water supply contract in Bangalore there is substantial liquidity in the domestic market and it is possible to raise the entire debt financing locally. Also India has a very large manufacturing and construction capability and it is possible to source the entire project locally so it is not even necessary to procure equipment from offshore. In India fixed rate finance is common so we do not have the same concern s over interest rate exposure.

However these examples may well be unusual as increasingly in emerging markets the public sector is turning to the private sector to solve some of their pressing infrastructure problems. It is in those countries where there is little availability to raise domestic debt and there is no effective long term derivatives market to hedge the foreign exchange exposure than other solutions must be sought.

In these markets hedging currency and interest rate exposures can be broadly broken down in to two categories:-

1 **The direct hedge**
2 **The indirect hedge**

And are shown in the following:-

DIRECT HEDGE OF FOREIGN EXCHANGE AND INTEREST RATE EXPOSURE

- ***Fund the project domestically to match the project's assets and liabilities. This is dependent upon there being a deep and liquid domestic market. Domestic funding would normally be at higher rates and shorter tenors than offshore funding and fixed rate finance may not be available. Place a cap on domestic interest rates and capitalise any interest costs above the cap.***

- ***Link the Tariff to changes in the value and costs of the domestic currency. The customer may be unwilling or unable to accept the foreign exchange exposure.***

INDIRECT HEDGE OF FOREIGN EXCHANGE AND INTEREST RATE EXPOSURE

- ***Link the Tariff to changes in domestic inflation rates and provide a debt service reserve fund to cover short term cash flow deficiencies.***

Over time, the financial markets in these emerging markets will start to develop and it should be possible to undertake substantially more local currency financing of projects. However this will not be a universal development in all emerging markets and for those countries which are unable to develop liquid and deep local markets will still be reliant upon external funding unless intervention can be offered by international financial institutions.

Whilst some international financial institutions such as the export credit agencies are able to provide fixed rate funding in "exotic" currencies these are normally limited to those countries which have a reasonably efficient local capital market. Some multi-lateral agencies are assisting by investing in local domestic financial institutions this provides not only liquidity but also expertise. It will be necessary to see more investment in local financial institutions and a willingness to take some of the financial exposure that such an investment implies.

WORLD BANK 1999
WATER SUPPLY AND SANITATION FORUM
April 8 – 9

THE INSTITUTIONAL REFORM OF THE URBAN WATER SUPPLY SUB-SECTOR IN SENEGAL

Introduced by : Jean-Luc GUYOT
Director, Adviser to CEO
SAUR INTERNATIONAL
France

Presented by : Mamadou DIA
Deputy managing Director
Sénégalaise Des Eaux
Sénégal (West Africa)

Almost everywhere in the world, and more particularly in Africa, the reform of water companies is in the order of the day. This has become a topical issue in view of the performances recorded in the urban water supply sector.

1. INSTITUTIONAL CHANGE :

From 1960 to 1971, the public service of urban water supply distribution was ensured by La Compagnie Générale des Eaux du Sénégal (Senegal's General Water Supply Company) , a subsidiary of CGE France, under the delegated management system.

IN 1971, the public service was nationalized . A national company was created: The Société Nationale des Eaux du Sénégal (SONEES) under the same delegated management system.

IN 1983, within the framework of the eleven-center project funded by the IDA and the CFD , a new institutional reform was carried out following the findings of the study conducted by the consulting firm IDET-CEGOS. This reform gave SONEES the public service concession while strengthening its management autonomy and by giving it real financial autonomy.

2. RESULTS ACHIEVED BY SONEES

The results achieved by SONEES were mitigated ones despite the successes recorded in the area of low-cost connections, network extension and electromechanical maintenance.

Indeed, this relative success concealed financial and technical difficulties.

The most serious challenge facing SONEES was to compensate for the capital's water deficit , with all attendant disadvantages for the populations, the industries and for its own viability when one knows that Dakar accounts for more than 60% of the sector's activity.
The strategy for the compensation of this deficit was designed in two phases:

- A first phase, a short-term one, aimed at reducing the deficit through making available 59,000 extra cubic meters a day. This phase is mainly funded by donors.

- A so-called long-term second phase aimed at meeting the needs of the capital for the year 2030 through piping water from Lake de Guiers located some 250 km from Dakar.

The scope of the investments needed being outside its reach, the Government of Senegal called on its traditional development partners with which it agreed on the need to reform the sector before such huge investments are made.

3. NEW INSTITUTIONAL FRAMEWORK FOR WATER AND SEWARAGE SERVICES

The modification of the institutional framework was thus planned, with the involvement of a private structure to ensure the return
of growth and profitability to the sub-sector, which would bring the following benefits:

- **better quality** in public drinking water and sewerage services;
- **faster extension** of these services to the urban districts which have yet to benefit from them;
- **better control** of the costs of services, that is of the price of the cubic meter of water to be paid by the subscriber;
- **securing** and ensuring growth in fiscal revenues.

In the new institutional framework, three entities are in charge of the management of the Urban Water Supply Sub-Sector, under state supervision.
These are:

- **La Société Nationale des Eaux du Sénégal** (SONES), a state owned facilities company.
- **La Sénégalaise Des Eaux** (SDE) , a private company.
- **L'Office National d'Assainissement** (ONAS) (*national effluent treatment office).*

The core mission of the reform is the « **controlled development of the urban water supply sub-sector in Senegal** » through the establishment of robust structures with appropriate financial and technical capability.

The new institutional framework introduces a new management system of the « delegated management » type.

In this type of contract, the different functions of the sector are distributed among three entities and the State remains the owner through a state-owned facilities company, in addition to the state's function relative to the determination of the sector's strategy.

(For the mission of each entity: see Annex 1).

This formula, which led to the introduction of a private professional to get greater efficiency, made it possible to make a reassuring impact for donors and was profitable to the urban water supply sector with significant gains at all levels, namely on invoicing and payment collection ratios, on staff productivity, on investment expenses and on the costs of supplies.

4. THE PRIVATE OPERATOR'S INVOLVEMENT IN INVESTMENT RENEWAL OPERATIONS

In addition to the obligations relating to the efficient operation of the public service, the contract also imposes on the delegated management company certain obligations in relation to engineering work.

The particularity of the contract lies in the private partner's commitment to make renewal investments associated with contractual performance objectives (unaccounted for water reduction, water quality, etc...).

We are thus in the presence of a delegated management with a share of concession, which is both an innovation and a token of willingness to further involve the operator in investment operations in a bid to keep tariffs at acceptable levels.

SDE's involvement in investments concerns the following aspects:

WORK REQUIRED	ORGANIZATION RESPONSIBLE
Renewal of network and connections • **17Km/year** equivalent diameter 100 mm cast iron • **6, 000** connections per year • **14,000** meters per year Renewal of electromechanical equipment • electromechanical equipment below **15 million** in value and with a service life of less than or equal to 10 years.	**S.D.E.**
Network upgrading (5-year program) • **100 km** equivalent diameter 100 mm cast iron • **30,000** connections.	**S.O.N.E.S.**

5. RESULTS OBTAINED AFTER THREE YEARS OF OPERATION

5.1. - On the technical front

5.1.1. Production

At the start-up of service, the production tool was under equipped and decayed, which limited performances for Dakar's water supply to 190,000 cubic meters/a day.

This situation led SDE to make significant efforts in re-equipping bore holes, which made it possible to take production to 205,000 cubic meters/a day.

5.1.2. Water shortage management in Dakar

The management of water shortage in Dakar for the year 1998, 15,000 cubic meters/ a day taken from the city's water supply upstream system and transferred to Dakar's central areas where the deficit was more pronounced. This water transfer accounts for 6% of the total volume produced in Dakar.

This good mastery of the network made possible:

- the edition of a water presence card to facilitate the information of the staff;
- to supply water to all districts at least once during the day;

- to avoid collective claims associated with water shortage.

5.1.3. Efficiency of the network

The profitability of the network underwent a good progression thanks to:

- carrying out contractual work
- making invoicing reliable

The evolution noted is as follows:

	23/04/96	1996	1997	1998
Profitability	68.2%	69.5%	72%	74.4%

5.1.4. Mastery of technical losses

Within the framework of the mastery of underground leaks, the operator equipped itself with two electronic leak-detection systems, which made it possible to save almost 10, 000 cubic meters /a day between 1996 and 1998.

This saving corresponds to an investment of two bore holes of 250 cubic meters for 20 hours of pumping or 4.8% of Dakar's production.

5.1.5. Contractual work

The contractual work program, set out in the delegated management contract, was carried out satisfactorily. The following results were obtained on 31/12/98:

Contractual work	**Cumulated goal 1996/1997/1998**	**Cumulated execution 1996/1997/1998**	**Execution rate**
canals (km)	45.3	38.15	84.16%
connections (u)	16,125	15,656	97.09%
meters (u)	37,625	40,184	106.8%

The execution of these works had a significant impact on the enhancement of the network's profitability.

5.1.6 - Computerized cartography

In order to improve the network's management, the availability of updated plans is necessary. Within this framework, the private operator got equipped with a computerized cartography station whose performances are as follows after 2.5 years:

Total plans to be digitized	56,000 hectares
Total digitized	55,800 hectares
Execution level	99.6%

SDE has reached a digitalization level that is often reached in Europe and this performance will make it possible to comply with the contractual commitment which provides for three years to update plans and to have reliable plans.

5.1.7. - Leaks on the network and connections

Marked improvement was noted in response times for the repair of leaks by SDE , combined with the rehabilitation of the network. In this field overall performances are as follows:

- **Number of leaks:** renewal work carried out on the network and connections executed by SDE , combined with the rehabilitation of the network and connections undertaken by SONES and SDE:

  - **network:** - 4%
  - **connections:** - 1.5%

This is a long-lasting work and the results will be clearer with the continuation of the efforts undertaken by SONES and SDE.

- **Average intervention deadline:** From 52 hours, we went down to less than 24 hours in Dakar and 8 hours in the regions.

5.2. On the water quality front

Thanks to the efforts made to maintain a chloride residual at all points of the network, water quality got significantly improved. The 1998 results are as follows:

	Objectives	Execution	Rate
1. Bacteriological analysis			
• number of samples analyzed (u)	6,972	7,309	104%
• efficiency rate	96%	95.4%	99.37%
2. Physico-chemical analysis			
• number of samples	2,316	2, 205	95.2%
• conformity rate	96%	97.2%	101.2%

At the rate of 99,4 % , water is in conformity with the standards of the World Health Organization (WHO) .The analyses were carried out by the SDE Laboratory and checked by Dakar-based Pasteur Institute.

The rehabilitation of chloride stations scheduled as part of the **PSE** will make it possible to improve and maintain the bacteriological quality of the water distributed.

5.3. On the invoicing and payment collection front:

5.3.1. - Streamlining of customer management

Customers are at the center of our organization and, in this respect, our credo was to improve customer satisfaction through concrete actions, the main ones of which are as follows:

- **Modernization of agencies**
  With the program for the establishment of subscriber management program « OCEANS », a real revolution took place in commercial agencies. The gradual modernization of agencies makes it possible to ensure better reception and working conditions for the company's clients and collaborators.
  Thus, service quality was greatly improved. The treatment of the different operations is accelerated thanks to a better adapted subscriber management computer tool.
  Queues during peak client turn out periods are better managed with pre-numbered tickets and extra payment-desks for the elderly.

- **Check Boxes**
  Check boxes are open round the clock in Dakar's « OCEANS » modernized agencies.
  The customer only needs to slip his.
  Payment check, along with the bill, into the agency's check box by ensuring that the check bears the correct amount.

- **Displaced payment**
  Moreover, if the clients comes within the purview of a given « OCEANS » modernized agency, he can from now onwards pay his bills in any other agency that is equally equipped with the « OCEANS » facility. This payment possibility is currently offered to customers in the above-mentioned agencies equipped with the « OCEANS » facility.

5.3.2 - Invoicing and payment collection

5.3.2.1. - private customers

The contractual payment recovery goal was reached and the evolution rate is as follows:

Year	Objectives	Executions	Observations
1995 (SONEES)	-	92.2%	-
1996	95%	97%	to 31/12/98
1997	96%	96%	-
1998	97%	The rate is contractually determined on 31 May 1999	

5.3.2.2. - Administration and Town Councils

The Senegalese Administration generally complies with the procedure of payment at the right time and real political will is noted on the part of the authorities to pay the Administration's bills within prescribed deadlines.

This political will is translated by the following results:

- **1996:** 100 % payment
- **1997:** 100 % payment
- **1998:** 97,7 % payment

The difficulties encountered took place in the Town councils which were not yet ready to implement the reform. However, the measures taken by the operator, in concert with communal authorities, made it possible to significantly reduce consumption levels in the communes which underwent the following evolution:

	1996	1997	1998	Reduction	
Invoiced volume (cubic meters)	2,180,000	1,960,000	870,000	60%	96/98
Amount (in millions CFA F)	726.650	650.710	349.550	51.9%	96/98

A 60% reduction of consumption levels in the communes is noted, which translates into a 51.9 % reduction of their bill.

5.3.3. - Evolution of the number of subscribers

The number of subscribers underwent positive change , going up from 203, 922 subscribers in 1996 to 231,013 subscribers in 1998, with an overall turnout (SONES and ONAS royalty included) which went up from 23.5 billion CFA Francs in 1996 to 27.2 billion CFA Francs in 1998.

Increased access of the greater part to water , with low-cost connections funded by SONES was noted, which made it possible to earmark extra financial means put at the disposal of the sector.

5.4. - The putting in place of modern management tools

After the installation of the « OCEANS » facility which is a new subscriber management tool , SDE has gradually put in place the following management tools:

- cost accounting software;
- budgetary monitoring CRISTAL software;
- (purchases/stocks monitoring) HA 3000 software;
- (cash management) Eurocash .

These modern management tools made it possible for SDE to gain in efficiency. As a case in point, the operator's accounts for the financial year 98 were closed on 1st February 1999, whereas that operation previously took place each year in June.

5.5. - Training

A training program is devoted to the 1,300 SDE agents, with as its priority thrusts the retraining of technical and commercial staff, customer relations, service quality, literacy, etc...

The efforts made are translated into:

	Number of trained agents	Number of training hours	Cost of training
1996	644	25,008	288 million CFA F
1997	1,110	57,967	420 million CFA F
1998	1,148	49,501	383 million CFA F

The improvement of the productivity of agents through continuous training constitutes a challenge to meet the goals assigned to the Operator, which will not fail to negatively impact on the sector's performances.

5.6 - Financial relations with the sector's partners and the investments made

	1996	1997	1998	Total
1. Royalties paid to SONEES (million CFAF)	4465	7417	8183	20066
2. Royalties paid to ONAS (million CFAF)	696	1084	1281	3062
3. Directs investments made (million CFA F)	7,965	5,644	3, 810	17, 419

Without being exhaustive, the significance of the amounts injected augurs well of the future development for the sector's financial equilibrium, as well as for all expected results.

5.7 - Customer satisfaction survey

As can be noted, SDE has opened and carried through the main tasks of its coming into stream. The serious efforts made by the company were also noted by customers. The survey conducted in May-June 98 with 1,500 customers in the districts of Sicap-Liberté, Guédiawaye, Grand-Dakar and Pikine demonstrates it.

An 83% satisfaction rate was expressed by customers as regards SDE's service quality. The overall results of the survey are a recognition of the relevance of the company's development program, applied since its establishment and, above all, an encouragement to keep going forward to make the institutional reform successful.

6. - THREE YEARS AFTER THE REFORM

After three years of operation, it can be said that the urban water supply sector in Senegal presents an attractive physiognomy despite a few problems identified.
This confirms the relevance of the Government's decision to restructure the sector.
The leap recorded at the level of the sector translates into:

- an urban water supply sector capable of self-financing itself;
- permanently improved service quality;
- a positively-evolving network profitability;
- improved recovery rate;
- rapidity in customer-related interventions;
- good quality of the water distributed

7. - THE DIFFICULTIES ENCOUNTERED

Despite the difficulties encountered after three years of reform, there are still problems to be solved in order to accelerate the sector's development and definitively resolve water supply problems in the city of Dakar.

- **Development of the sector**

The financial means generated by the sector are still inadequate in view of the significant needs identified. In fact, the current development pace, characterized by an increasingly high demand, calls for the putting in place of funding mechanism that make it possible to monitor the sector's evolution and to meet the demand.

- **The problem of Dakar's water supply**

The execution of the Sectoral water supply project will reduce water shortage-related problems in Dakar without resolving them altogether. With the availability of the project's 59,000 cubic meters/ a day, water shortage management will be facilitated. However, the high demand, estimated at 6% per year, will lead to a deficit as early as the year 2002 and the investments expected to definitively resolve these water problems in Dakar are heavy.

At present, Senegal is moving towards the following technical options:

- **2001-2010 Period:** This option consists in building , in the form of a **BOT,** to the tune of 135,000 cubic meters/ a day, a water treatment station on Lake de Guiers with all components necessary for water transportation.

- **2010-2030 Period:** This is a long-term project aimed at meeting the water needs of Dakar until the year 2030. Several technical options are planned (pipes, **desalting,** etc...).

8. POSSIBLE SOLUTIONS

To accelerate the development of the urban water supply sector in Senegal, and to definitively resolve Dakar's water supply problem, several solutions are possible.

- **Association of public and private funding**

Significant financial efforts were made by the State of Senegal, thanks to the support of international donors, to accelerate the development of the urban water supply sector.

However, the significance of the investments to be made calls for heavier and heavier investments that the States are no longer capable of supporting. This is why the private sector's participation in the form a public/private partnership could make it possible to allocate extra financial means to the development of the sector.

A deepening of the public/private partnership will lead to:

- a better performance of the sector
- the achievement of common goals.

- **Intervention of the private Operator in the funding of new equipment**

The delegated management contract into force in Senegal makes it compulsory for the private operator to put in place a certain number of infrastructures. The extension of the missions of the operator to the funding of new equipment would also help achieve faster development.
Such an involvement of the private operator would help go further, faster and more efficiently.

- **Contractual evolution**

Greater involvement of the private sector in the sector is expected to be underlied by a contractual evolution. The existing institutional framework is not a fixed framework, therefore its evolution is possible.

It would only be a question of introducing modifications that will make it possible to have a contract consistent with the new missions assigned to the private operator in a more in-depth public/private partnership.

9. - THE SENEGALESE EXPERIENCE

The experience of the Senegalese reform is of interest to several African countries. This is why the sector has received, over the last few months, the visit of delegations from Ghana, Nigeria, Niger and Guinea-Bissau. The expertise of several senior executives of the sector, namely those of SDE, is increasingly sought after by the World Bank and SAUR International within the framework of other restructuring projects in Africa.

The Senegalese model is a reference that needs to be adapted to each country's specific context.

Done in Dakar on 23 March 1999

Annex 1

DISTRIBUTION OF FUNCTIONS IN THE SECTOR

	Functions of drinking water distribution services	Roles	Actors
1.	Definition of the sectoral policy	Strategic definition of the sector	The State
2.	Management of water resources		
3.	Drawing up of a legislative and statutory framework, and water policing		
4.	Approval of the pricing system and the price of water		
5.	Property management(valorization, amortization and debt servicing)	Management of means	State-owned facilities company
6.	Blueprint, investment programming and fundraising		
7.	Implementing agency of infra-structure rehabilitation work		
8.	Implementing agency of infra-structure extension work		
9.	Sensitization of the public		
10.	Control of the quality of the operations		
11.	Exploitation and maintenance of the infrastructure and the operations equipment		
12.	Renewal of the equipment, connections and meters		

	Functions of drinking water distribution services	Roles	Actors
13.	Renewal and extension of networks (equivalent-kilometers to be determined according to diameters)	Technical and commercial management	Operations company
14.	Extension of networks funded by third parties		
15.	Study and justification of the need for infrastructure rehabilitation work		
16.	Study and justification of the need for infrastructure extension work		
17.	Invoicing and payment collection		
18.	Communication and customer relations.		

"The Owners Perspective"

Judy Wilson

WORLD BANK
WATER FORUM

Judy L. Wilson
April 1999

BLAKE, CASSELS & GRAYDON

"What are governments really worried about when they involve the private sector? What do they think their risk is?"

The Public-Private Context

- Understanding and trust between the public and the private sectors
- Every contract provision allocates risk
- Public entities are generally risk averse and not familiar with concepts of adopting risk to save money or to make money
- Public owners are accustomed to public tender processes as a powerful tool
- Different Perspectives on "Risk"
- Different Perspectives on Contracts - Risk Allocation versus Enforcing Performance

"Risk" Issues for the Public Body

- Protect the Asset from Deterioration
  - what condition is the asset in at the time the Operator takes over
  - is there an incentive to encourage ongoing financial investment in the existing infrastructure (corrective/preventive maintenance)
  - is there a deterrent to discourage deterioration of the infrastructure
  - articulation of expectations re: levels of maintenance

"Risk" Issues for the Public Body

- Perspective

"The Public Owner must ensure that the Operator will bear the risk of the deterioration of the infrastructure in order to ensure that the risk is managed by the party in the best position to manage it."

"Risk" Issues for the Public Body

- Public Health and Customers

  - Will the Operator be cooperative and provide assistance
  - Will the Operator cause a public health or environmental problem
  - Will Operator act as a government would act in an emergency situation
  - Will Customers be treated well
  - "Ultimate Responsibility" issues

"Risk" Issues for the Public Body

- Perspective

"In the event of a threat to public health, the public body, notwithstanding the presence of the private Operator, will be called upon to manage the situation. The contact must shift a significant responsibility to the Operator to avoid such a risk."

"Risk" Issues for the Public Body

- Transition After the Operator Leaves

  - the risk that sufficient system/infrastructure information may not be available to properly run the system after the expiration of the contract
  - will the Operator entrench itself by the use of technology to which it has exclusive rights/licences
  - will the Operator encourage technology transfer to local staff or will the expertise leave with the Operator
  - will there be a smooth transition to a subsequent Operator

"Risk" Issues for the Public Body

- Perspective

"The public body has an ongoing responsibility for the provision of water and wastewater services and must always be concerned with what will happen when the private Operator leaves. The public body must protect against this risk by imposing conditions on the Operator and mitigating this risk."

Public Owners and Risk

- Revenues/Tariffs - Protecting the Customer from "Rate Shock"

  - Public bodies focus on the social implications of "excessive" tariffs
  - Public bodies are often concerned with the political and social implications of tariff increases and such issues as rate shock. A revenue shortfall as a result of demand shortfall may not be a concern.
  - Private entities look upon tariffs as the system's revenue. They focus on such issues as ensuring that demand is accurately forecasted so that the risk of a revenue shortfall is minimized.

"Risk" Issues for the Public Body

- The Full Bundle of Services

  - will the Operator try to charge extra for services which are part of the routine operation/management/construction of infrastructure

"Risk" Issues for the Public Body

- Performance Standards

- what if the Operator does not perform

- withholding and liquidated damages "tools"

"Risk" Issues for the Public Body

- Information Access

  - will the Operator provide open access to information

  - the "public" nature of water

Risk mitigation:

The Chengdu Experience

RISK MITIGATION
The Chengdu experience

GÉNÉRALE des eaux

Presentation summary

1- Project Equation

2- A need for further risk mitigation

3- Mitigation of municipal risk

4- Resort to limited sponsor support

5- Resort to 2 complementary MLAs : ADB and EIB

6- Chinese approvals

Conclusion

1- Project equation : project strengths

- **A favorable BOT framework**

  Third project after Laibin And Changsha, first water BOT

  Strong central government involvement (SDPC, Bridge of Trust….).

  Preferred status of Chengdu city, whose project was selected

- **An advantageous location : Chengdu**

  Abundant quantity and high quality of raw water

  Shortage of treated water

  A tradition of water management

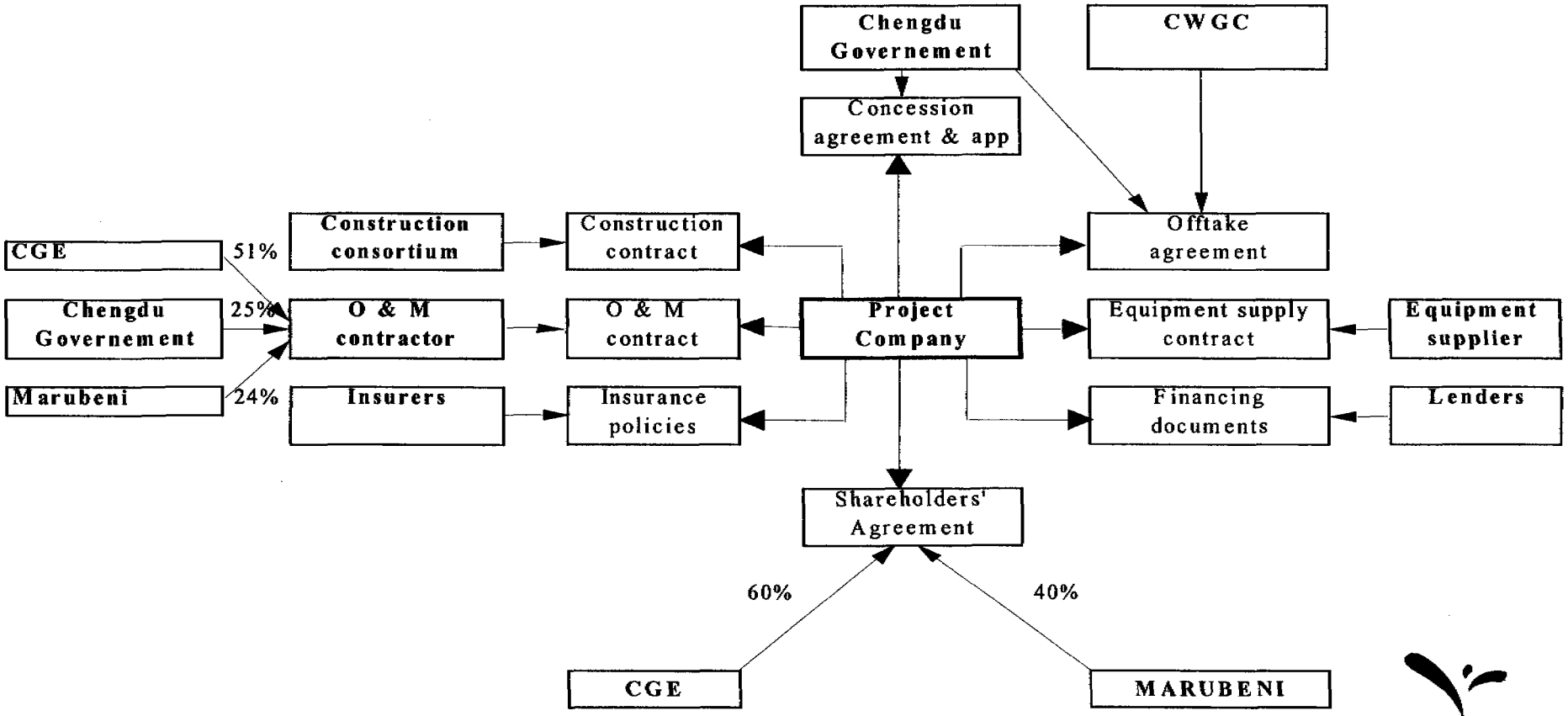
  Political willingness to develop non coastal provinces

1- Project equation : project strengths

- **A relatively small total investment cost**

  Total cost $ 106.5 m debt financing $ 74.55 m (70/30)

- **A strong technical/contractual structure**



GÉNÉRALE des eaux

1- Project equation : project strengths

- **Strong cash-flows**

  Base case minimum DSCR is 1.26

  Base case LLCR is 1.57

  Strong resistance of CF vis à vis sensitivities

  6 months debt service reserve funded from excess cash-flow

- **Contractual mitigation of political risk, forex risk, and Force Majeure Risk**

  Central government approval issued by SDPC

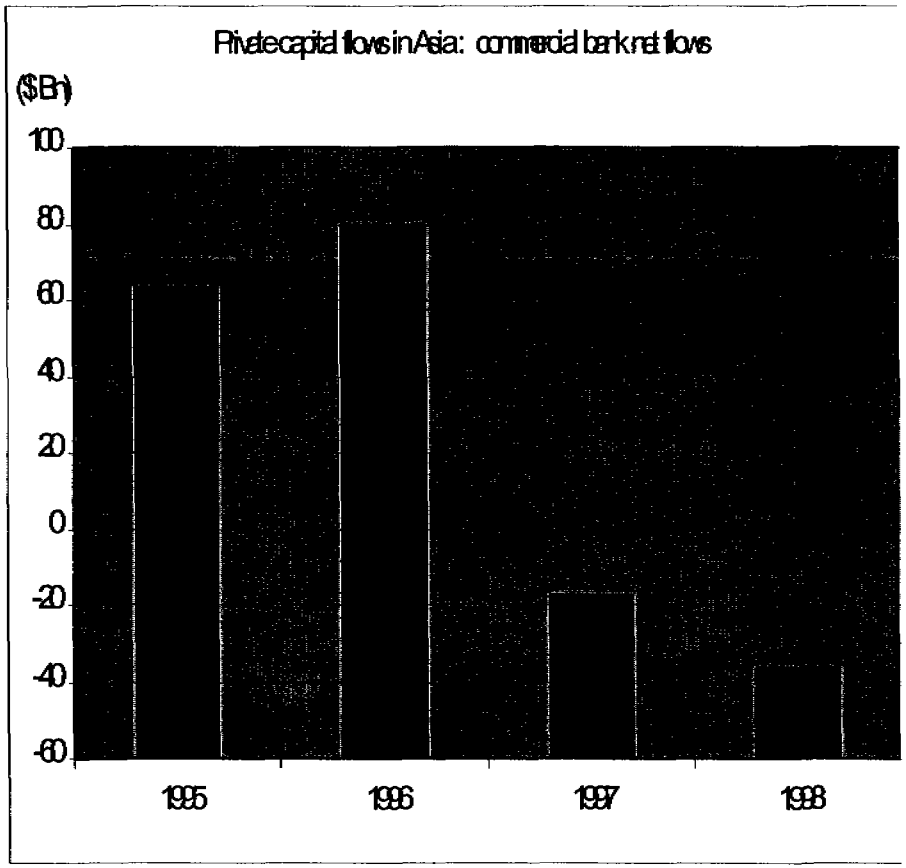
  Change in law entitling to compensation

  Tariff adjustment is case of devaluation

  SAFE registration of the loan

  FM event ===> additional FM payments or extension or early termination compensation

1- Project equation : difficult market conditions



GÉNÉRALE des eaux

2- A need for further risk mitigation

	Strong contractual/technical profile
Despite	**Strong project economics and background**
	Good basic risk mitigation
Given	**Extremely adverse market conditions**
	Growing risk aversion for China risk

A need for further risk mitigation arose in the midst of the financial structuring

3- Mitigation of Municipal risk

- **CWGC financial capability**

Volume secured by strong water consumption

- Strong annual growth trend over 7%
- Expansion of the distribution network

Price secured by favourable framework and affordability

- Tariff increase policy applied in last 5 years
- Tariff formula compliant with new tariff guidelines
- Low affordability ratio

3- Mitigation of Municipal risk

- **CWGC financial capability (continued)**

Past financial performance

- A profitable company
- One of the best water utilities in the PRC

Support from the Chengdu government

- Water risk charge stabilisation fund
- Development fund

CWGC is able to face its offtake obligations under current/normal conditions, including RMB devaluation.

GÉNÉRALE des eaux

3- Mitigation of Municipal risk

- **Chengdu Government support**

Chengdu Government obligations

- Back up of CWGC obligations under offtake agreement
- Direct obligations under Concession Agreement, including termination payment

Chengdu Government source of funds

- Cash surplus in projected budget
- Other sources of funds quickly and directly available

CG is able to meet maximum termination payment obligations, even in a severe devaluation scenario

4- Resort to limited sponsor support

- **Limited financial completion guarantee during construction period**
- **Limited post-completion support in case of cash deficiency**
- **Ownership undertaking**

Financial sponsor support enhanced debt service capacity in combinations of worst case scenarios

5- Resort to 2 complementary MLAs

- **ADB's involvement**

  ADB participated in the development of the project on behalf of PRC

  ADB participated in the whole due diligence

  ADB gives the benefit of its multilateral status

  A loan : 15 years maturity, US$ 26.5 m, 11 years average life

  CFS (B loan) : 12 years maturity, US$ 21.5 m, 8.5 years average life

  ADB participated in the syndication process

5- Resort to 2 complementary MLAs

- **EIB's involvment**

  EIB participated in the technical due diligence

  EIB provides political cover on its tranche

  EIB is counter-guaranteed by commercial banks for commercial risk

  EIB loan : 12 years maturity, US$ 26.5 m, 8.5 years average life

Co-participation of ADB and EIB secured 100% political cover on debt financing

6- Chinese approvals

- SDPC
- SAFE, MOFTEC
- ADB MOU

In the absence of explicit central government financial support, ADB MOU catalysed the success of the syndication

Conclusion

Equity

CGE	**US$ 19.2 m**
Marubeni	**US$ 12.8 m**

ADB **A loan** **US$ 26.5 m**

Debt

Institutions	ADB Complementary Loan	EIB Guarantee
ANZ Investment Bank	US$ 3,300,000	US$ 5,000,000
Barclays Capital	US$ 3,300,000	US$ 5,000,000
Crédit Lyonnais	US$ 3,300,000	US$ 5,000,000
DBS Bank	US$ 3,300,000	US$ 5,000,000
Dresdner Bank	-	US$ 4,150,000
Fuji Bank	US$ 5,000,000	-
KBC Bank	US$ 3,300,000	US$ 5,000,000
TOTAL	**US$ 21,500,000**	**US$ 29,150,000**

GÉNÉRALE des eaux

DIRECTIONS IN DEVELOPMENT

Wastewater Treatment in Latin America

Old and New Options

EMANUEL IDELOVITCH
KLAS RINGSKOG

4
Options for Financing and Implementation

Constructing wastewater treatment plants is capital-intensive. Recent examples of competitively procured plants indicate an investment cost of $100 per capita of the design population. The investment cost per capita of the initial population can easily exceed $200, because it usually takes a number of years before the population actually served matches the design population. Where treatment plants are not bid competitively, the investment cost per capita is likely to be even higher.

To operate efficiently, such plants require competent operators and additional funds for current expenditures such as labor, materials, spare parts, chemicals, and energy. Improperly operated plants cannot ensure a high-quality effluent and a sludge that can be disposed or reused without representing a risk to public health or the environment. Only if such effluent and sludge are produced can the wastewater plant be considered successful and the capital used for its construction well invested.

Conventional Management and Financing of Public Projects

Until recently, wastewater treatment plants in developing countries, like any other component of a municipal water supply and sewage disposal system, were financed by governments or by government agencies. Typically, the public water supply and sewerage agency was responsible for undertaking preliminary studies as well as for designing and constructing the plant. In most cases, the public company contracted the

studies and the design with a specialized private engineering firm, the construction with a private contractor, the equipment with one or more suppliers, and the supervision of the project execution with an engineering firm. In some cases, the contractor had to supply equipment as well. Only in isolated cases, and for relatively simple plants, did the public agency carry out the studies and designs in-house. Many contracts included the responsibility of the contractor to operate the plant, but only during a limited period (usually between three months and one year) for running-in the equipment and confirming the capabilities of the process.

In the past, treatment plants were often financed with the help of loans from international and bilateral agencies. Such financing was contingent on explicit or implicit central or local government guarantees that could be called in if the borrower did not service the debt in a timely fashion. In this way both lenders and operators were protected against all kinds of commercial and political risks. Such reassurances can give rise to complacency and even abuse because the government with its taxation and borrowing powers is thought to be able to bail out any shortfalls in the project's debt service. In addition to not promoting the best performance of suppliers, contractors, and operators, such all-inclusive government guarantees also use up too much of the government's limited guarantee capacity. In the process, they could crowd out other projects, for instance in the social sectors where government direct financing or guarantees are a must. Granting guarantees for revenue-generating projects that could well be financed without them does not represent an optimal use of the government's creditworthiness.

As a result of such full-recourse financing and public project management, many of the wastewater treatment plants constructed in developing countries have been plagued by cost overruns, implementation delays, and operation and maintenance difficulties. One of the major deficiencies of this scheme is that responsibility for the process selected is split between the consultant who recommended it and the contractor or equipment supplier who implemented it.

Turnkey Contracts with Government-Recourse Financing

"Turnkey" contracting represents a slightly more advanced conventional method, whereby a consortium of firms is responsible for both designing and constructing the plant. Although such schemes eliminate the possible conflict in responsibility for design, construction, or equipment, they do not guarantee long-range efficient performance of the

plant. When such turnkey contracts are financed with full recourse to the government, they invariably suffer from the disadvantages of an unequal sharing of risks. The public sector will continue to bear the commercial risk during the operational stage. This is a weakness given the frequently poor performance of the public sector in the operations and maintenance stage.

Limited-Recourse or Nonrecourse Financing: BOOT Schemes

The difficulty of having the public sector finance such a large current and capital expenditure has made it natural to look at private sector participation as a way to finance water and wastewater projects in developing countries. Governments are keen to identify projects in sectors that have a potential to generate revenue, to become financially self-sustaining, and to be financed without public sector guarantees. The intent is to steer the government toward projects in sectors where there is no alternative to continued public sector management and financing.

The most extreme form is nonrecourse financing, where project sponsors and investors have no assurances from the government but depend entirely on cash generated by the project. This shifting of risk from the government to the private sector is in practice difficult to achieve. A compromise is then struck in which private sponsors and investors have limited recourse to the government, for instance in the form of a guaranteed minimum level of revenue.

A number of schemes exist in which the private sector finances, builds, and operates wastewater treatment plants. One common designation is BOOT, which stands for build, own, operate, and transfer schemes. Under a BOOT contract, a firm or a consortium of firms finances, builds, and operates the plant. The private sector retains ownership of the facility throughout the operations period and is allowed to charge a tariff sufficient to recover the investment. At the end of the operations stage the facility is transferred to the government, free of charge and in good operating order.

A variation is a BOO (build, own, and operate) contract in which private ownership is retained indefinitely. Other variations include BOL schemes where the private firm builds the project with government financing but then stays on to operate the plant while paying an annual lease fee. The gamut of schemes is limited only by the imagination of the parties.

The main objectives for introducing BOOT contracts in wastewater treatment are to make the operation and management of the plant more

efficient, to attract new ideas and technologies, which could lower costs, and to finance the investment without public guarantees in any form.

Efficiency Gains of BOOT Plants

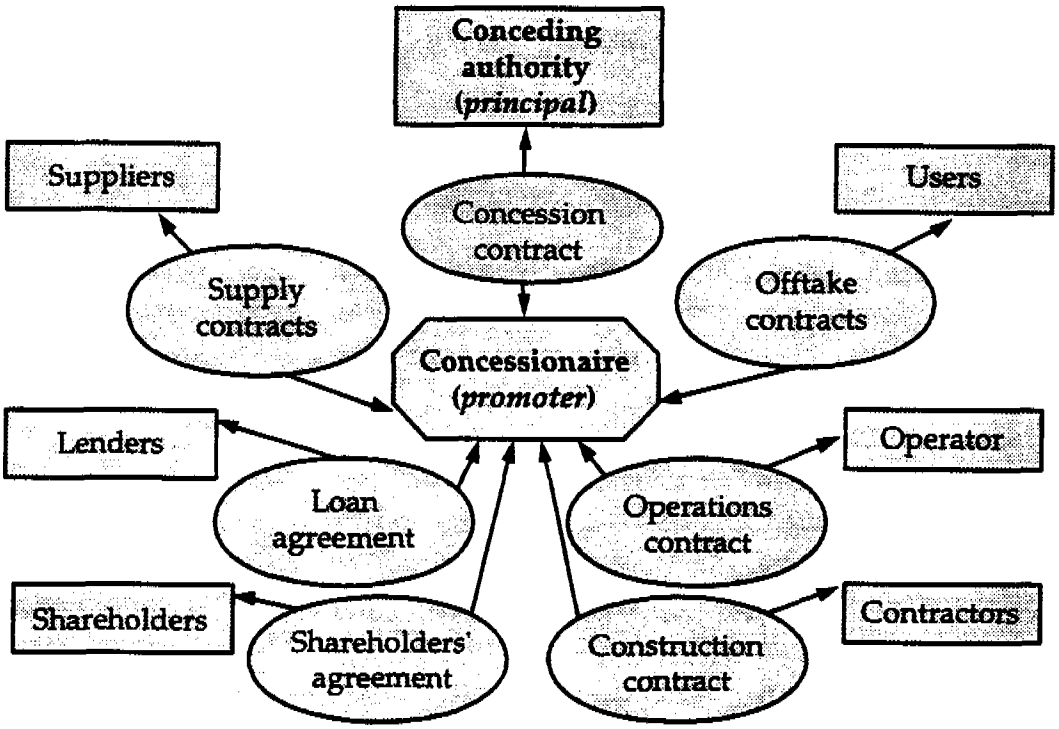
The efficiency targets are likely to be reached as far as the design, construction, and operation of the plant itself are concerned. In contrast, an efficient BOOT plant will not automatically resolve the larger problems of inefficiency in the total cycle of water supply and wastewater treatment. For instance, it is not uncommon to find that the water supply in a city is operated inefficiently, with levels of unaccounted for water as high as 50 percent, compared with efficient levels of 15 percent. In such a case, a BOOT wastewater plant built to treat the wastewater flow will necessarily be too large, at least initially. Similarly, it is not efficient for a city to contract with a BOOT operator to supply more potable water when rationing exists alongside unaccounted for water of 50 percent. In the same vein, a BOOT contract may not be the most efficient solution where consumption is excessive due to, for example, unrealistically low tariffs.

In situations like these, contracting with a BOOT operator should in no way remove the public sector's obligation to increase efficiency in those parts of the system that are not the responsibility of the BOOT operator. Ideally, BOOT contracts should not be bid until the system's efficiency is at a reasonable level. The difficulties are substantial, however, because achieving efficiency involves a combination of incentives for higher efficiency, better management in a number of areas, and also selective investments. Experience has proven that private operators are often more successful than the government in increasing operational efficiency.

General Principles of BOOT Contracts

A BOOT contract is a complex undertaking involving the *promoter*, which is given the right to build-own-operate a facility that provides a service in return for an agreed compensation before the facility is transferred back to the *principal*, which then concedes this right through a concession agreement. In turn, the promoter necessarily interacts with a host of other subsidiary parties during the course of complying with the concession agreement. The promoter, which can often be described as a capable "deal maker," attempts to reduce the substantial risks that it assumes under the concession agreement by entering into a series of subsidiary contracts. The most important of these subsidiary contracts are shown in the schematic representation of a full BOOT contract in figure 4.1.

Figure 4.1. BOOT Contractual Relationships



The first of the six subsidiary contracts may be a *supply contract* with the businesses or individuals that will be served by the facility. In the context of wastewater BOOT contracts, the supply contract will specify the quantity and quality of wastewater that will be supplied for treatment. In these projects the public authority or municipality granting the concession often represents the interests of all consumers. Instead of drawing up a special supply contract, the conditions and obligations of the clients will be included as part of the concession agreement. One such condition may be that consumers who have a supply of water are obliged to hook up to the public sewerage system in order to have their wastewater treated by the BOOT plant.

Under a BOOT contract for a wastewater treatment plant, the public authority is usually responsible for determining plant capacity, based on the estimated flow of wastewater. These estimates are of particular importance, because the public authority may guarantee the private contractor a particular level of wastewater flow to be treated and thus assume the risk of paying for the full service when the plant is used at less than full capacity.

The second type of contract is the *offtake contract*, in which the promoter agrees to supply output from the BOOT installation. Again, if the conced-

ing party is a municipality, it often is in the interests of the community to have the wastewater treated at a certain, agreed level. The quality of effluent will then be specified in the concession agreement. The private operator must supply the quality of effluent defined in the BOOT contract or pay a penalty. To enable the private operator to do that, the public utility must ensure that the influent to the plant is of acceptable quality.

A major issue in municipal wastewater treatment in general, and in BOOT contracts in particular, is the need to control industrial waste. Heavy metals or other toxic elements discharged by some industries may, above certain concentrations, stop the biological treatment process or impair the quality of the final plant effluent or the sludge produced by the plant. In order to ensure uniform quality of the plant effluent, the public authority must ensure that only legal industrial discharges are allowed into the municipal sewerage network and treatment plant. The BOOT contract should establish clear responsibility for monitoring and controlling industrial waste.

A special offtake contract is relevant where water is so scarce that the treated wastewater can be sold for reuse, for instance in agriculture or industrial processing. The promoter can then sign a special contract in which it agrees to supply wastewater of a certain quality and in amounts specified by time period.

The third type of contract is the *loan agreement,* in which lenders commit themselves to finance the construction of the BOOT facility. Often a lead lender will attempt to spread its risks by syndicating the total amount of the loan over a number of lending institutions. The private consortium will usually raise a large percentage of the financing required for the plant from commercial banks, as well as from bilateral and multilateral lenders, such as the International Finance Corporation. The duration of a BOOT contract should equal the period of time needed to allow the consortium to pay back the debt incurred and return the equity investment. BOOT arrangements represent a substantial risk for the private firms involved if there are no assurances that the investment will be recovered during the lifetime of the project.

The fourth type of contract is the *shareholders' agreement,* in which investors agree with the promoter to provide the specified amount of equity needed to construct the BOOT facility. The necessary amount of equity is often a consequence of the demands of either the lenders or the principal. Both have an interest in ensuring that the promoter secures a sufficient proportion of the investment financing as equity to provide a cushion against unfavorable developments in the project's cash flow. At times, the promoter will secure some equity from contractors or equipment suppliers that have an interest in having the facility built.

The fifth type of contract is the *construction contract,* in which the promoter passes on the construction risk to an experienced contractor. The sixth and final type of contract is the *operations contract,* in which the promoter secures the services of a specialized firm to operate and maintain the facility. Through a BOOT concession agreement, the principal actually procures a range of services such as financing, construction, operations, and marketing. Only very large international firms can provide the full range of such services in-house. In other instances the promoter will often form a consortium of firms such as civil works contractors, equipment suppliers, plant operators, and both foreign and local lenders and investors.

Risks of BOOT Wastewater Treatment Projects

A BOOT contract, like any other form of private sector participation, involves certain risks both for the private and for the public sector. A successful BOOT will depend to a great extent on how well these risks can be quantified and mitigated. Careful analysis of the risks involved should be carried out early in the process, and risks should be shared between the private and public sectors following the principle that whoever can control or manage the risk best should assume it and receive adequate compensation for doing so.

The chief planning tool for analyzing the risk associated with a BOOT project is the project's cash flow. Both equity investors and lenders look to cash flow as the main guarantee of a return on their investment and of timely debt service. There is a difference, however. Equity investors are apt to make their decisions on the financial rate of return of the cash flow over the concession period. A high rate of return may result even if the cash flow in certain years is in deficit. In contrast, lenders study the annual cash flow carefully and decide whether to lend or not based on the likelihood that their loan will be serviced in an orderly fashion. Because long-term debt has a fixed remuneration and does not enjoy the upward potential that equity has, it is more difficult to attract. For this reason, cash flow becomes the centerpiece for analyzing BOOT projects.

Illustrative Cash Flow in Wastewater Treatment Projects

Table 4.1 shows a typical cash flow for a wastewater treatment project. Typically, a BOOT concessionaire will commit itself to treat a daily contractual volume of sewage of certain characteristics to comply with

Table 4.1. Cash Flow in a Wastewater Treatment Project

	Volume of wastewater treated
x	Average tariff for wastewater treatment
=	Gross operating revenue
–	Operating expenses
=	Gross internal cash generation
–	Interest payments
–	Amortization of loans
–	Income taxes
–	Complementary investments
–	Dividends paid to investors
=	Surplus for concessionaire/investors

stipulated standards of effluent quality. In return, the concessionaire will be compensated with a wastewater treatment tariff. This tariff is typically the criterion for selecting among BOOT concessionaires that bid for the concession.

The concessionaire will have to pay operating expenses and is then left with a gross internal cash generation. The internal cash generation is likely to be used in a strict order of priority. First, the concessionaire will be obliged to use the internal cash generation to pay interest on any loans contracted to construct the wastewater treatment facility. Second, the concessionaire will have to amortize the loans according to the agreed conditions. Lenders are exceedingly sensitive that debt service be paid on time and will reserve the right to call in the entire loan if the concessionaire or promoters fail to service debt in a timely fashion. Third, the concessionaire will likely be liable to pay taxes. Fourth, the concessionaire will need to invest in complementary works as demand grows over the concession period.

The concessionaire will likely attempt to finance such investments out of the internal cash generation. When complementary investments are so large that they cannot be financed out of retained cash, the concessionaire will likely attempt to borrow additional amounts rather than to contribute any additional equity. Additional borrowings should become easier to secure as the concessionaire establishes a track record and as the regulatory and tariff regimes are successfully tested. Often different borrowings receive different priority claims on the available cash. Senior debt has first claim, mezzanine debt has a lower priority, while subordinated debt of different types has still lower priority. Some subordinated debt approaches equity that has the lowest priority. Only after all kinds of lenders, taxes, and complementary investments have been satisfied

will the concessionaire or project sponsor be able to receive dividends on its equity investment.

Risk Analysis

The cash flow of a typical wastewater treatment project is subject to many risks (table 4.2). Each item can vary depending on the magnitude of the risk. Both the public authority and the private operator incur risks under a BOOT contract. The risks will be analyzed from the vantage point of each of the two parties, placing special emphasis on the promoter's risk, which is usually the greatest.

Types of Risk

First, the amount of wastewater to be treated can be different from the amount envisioned in the contract. This type of risk is often referred to as *market risk*. Not only the volume treated but also the quality can be different. For instance, the wastewater may contain substances from industrial effluents that may harm the biological treatment process employed.

Second, the approved tariff actually paid can vary from what was assumed in the original cash flow calculations. For many types of infrastructure projects, the risk of tariff variations is determined by market competition, such as in transportation projects with competing modes

Table 4.2. Types of Risk in a Wastewater Treatment Project Cash Flow

Item	*Type of risk*
Volume of wastewater treated	Market
x Average tariff for wastewater treatment	Market (free competition) Political (under regulation)
= Gross operating revenue	
– Operating expenses	Operational/technical
= Gross internal cash generation	
– Interest payment	Financial
– Amortization of loans	Financial
– Income taxes	Political
– Complementary investments	Construction
– Dividends paid to investors	Political and transfer
= Surplus for concessionaire/investors	

of transportation. In the case of wastewater treatment, where one client, typically a municipality, has committed itself to pay a certain tariff, the risk is *political* in the sense that the concessionaire is relying on the stability and good faith of the methodology and its application in the calculation of tariffs.

There is, of course, always the risk that the client will not be able or willing to pay according to the volume of wastewater treated and the agreed tariff. BOOT contracts are usually signed by the promoter with one client, which could be a utility or a municipality. This *payments risk* can be considerable in the case of municipalities with a poor record of managing their affairs in an orderly fashion. The payments risk of municipalities is a good deal higher in developing than in industrial countries, where municipalities are careful not to endanger their access to credit markets by failing to honor their financial commitments in a timely and orderly fashion.

Third, the level of operating costs can differ from projected levels. Whenever the characteristics of the received wastewater prove to be at variance, operating costs will be higher to enable the operator to comply with the stipulated effluent standards. There is also the risk that the treatment technology employed will not yield the expected results even in cases where the wastewater characteristics are within the contractual parameters.

Fourth, interest payments will fluctuate over the life of the BOOT contract. This can best be described as *financial risk* because it depends on the financial conditions negotiated and on the evolution of financial markets. BOOT projects typically require long contract periods to allow the original investment to be recovered without resulting in such high tariffs that the consumers' capacity to pay is exceeded. However, financial markets in most developing countries are so unstable that few financiers are willing to lend medium-term funds or agree to fixed-interest conditions.

Fifth, an *exchange or currency risk* often arises when borrowings and equity contributions are in foreign exchange. Borrowings in external markets may often be the only way of obtaining reasonable maturities because developing countries often have no medium- or long-term credit market. Foreign borrowings are extremely vulnerable to sharp adjustments in exchange rates. Coverage against such exchange risks is prohibitively expensive or unavailable, except possibly over the short term.

Sixth, there is a risk that the government may modify its tax regime, which could affect the liabilities and cash flow of the concessionaire. Seventh, whenever works need to be built there is a *construction risk*. This risk is true primarily for construction of the initial wastewater treatment

plant. Eighth, foreign investors are subject to the risk of not being able to convert their surplus local currency into foreign currency. This *transfer risk* arises because wastewater treatment projects typically earn revenue in local currency but frequently involve foreign investors or operators that wish to be compensated in foreign currency. The risk arises because a country may not be able to attract enough foreign currency to allow all those wishing to purchase foreign currency to do so.

Risks may usefully be grouped into two major categories: global risks that vary with the political and economic situation in the country and project risks that are specific to the BOOT facility.

Level of Risks

The level of risks will vary among the different items of the wastewater treatment project (table 4.3). First, there is the risk that the quantity of wastewater will be different from the projected levels. There could be many reasons for variances. For instance, the amount of water consumed can decrease if water tariffs are raised. This sensitivity of water demand to tariff changes is measured by the price elasticity, which is calculated as the ratio between the relative change in water consumption and the relative change in water price. The price of water will also include the sewerage tariff whenever water and wastewater services are charged as a combined tariff. The short-term price elasticity is around –0.2, which implies that a doubling of the tariff could be expected to reduce the

Table 4.3. Level of Risks in a Wastewater Treatment Project Cash Flow

Item	*Type of risk*	*Level of risk*
Volume of wastewater treated	Market	Medium
x Average tariff for wastewater treatment	Market/political	High
= Gross operating revenue		
– Operating expenses	Operational/technical	Medium
= Gross internal cash generation		
– Interest payments	Financial	High
– Amortization of loans	Financial	Medium
– Income taxes	Political	Low
– Complementary investments	Construction	High
– Dividends paid to investors	Political/transfer	Medium
= Surplus for concessionaire/investors		

consumption 20 percent. In the longer term the price elasticity of demand is higher, or –0.45.

Where the tariff for wastewater is based on the amount of pollution discharged, the amount of wastewater could also change. The level of effective metering has a significant impact on the level of consumption. In the short term, metering can be expected to reduce average consumption around 40 percent—and in the longer term about 50 percent—compared with the situation in which consumption is completely unmetered.

Given the sensitivity of water consumption to price and metering, the level of risk must be rated medium. However, treatment projects are typically built to address a problem that already exists: the environment is polluted by the unsanitary and unsustainable disposal of wastewater. This makes the volume of wastewater to be treated a better-known quantity than in BOOT projects that aim to satisfy a demand to be developed. In addition to the risk that the quantity of wastewater may vary from forecasts, there is the additional risk that the characteristics of the wastewater will be substantially different from the characteristics on which the treatment technology is based.

Second, there is also the substantial risk that tariffs may lag those projected, which could occur for several reasons. Tariff setting is often politicized, and authorities may wish to slow the rise in tariffs in the belief, for example, that this will help slow inflation. Where tariff increases are authorized in line with projections, there is the risk that consumers will not be able to pay them. The risk of tariffs that are driven by short-term political considerations and the payments risk combine to create a high risk that tariffs may lag forecasts.

Third, there are operational risks in the sense that the treatment technology will prove unable to meet the contractual effluent standards or that the level of operating costs will be higher than projected. With an experienced specialized operator, these operational risks are at the most medium, particularly if the operator is part of the promoter consortium and has been involved in designing and constructing the treatment facility.

Fourth, the financial risks associated with volatile interest rates are high. The promoter faces a dilemma in trying to reduce these. If much of the financing is sought in domestic financial markets, interest rates will be considerably higher and more volatile than they are in international capital markets. If much of the financing is sought on the international capital markets, which have lower interest rates and less volatility, a foreign exchange risk is created. If exchange rates are realigned substantially, the impact on the BOOT project's cash flow can be severe and swift.

Fifth, the construction risk must be rated as high.

Mitigation of Risks

Risks are inimical to economical and efficient project construction because all parties require compensation to assume risks. It is therefore natural to attempt to reduce risks from the outset because lower risks will reduce the level of compensation demanded by project sponsors, operators, and lenders. Table 4.4 illustrates ways to mitigate or reduce risks.

First, market risk in the form of lower-than-expected wastewater flows can typically be reduced through judicious coordination of the investment programs that connect customers to the sewerage system. Failure to do so may result in underutilized treatment facilities. Even with good coordination between wastewater collection programs and the BOOT treatment plant, the promoter will often try to obtain a guaranteed level of income through a take-or-pay contract in which the principal, often a municipality, commits itself to pay a minimum amount irrespective of the volume of wastewater treated.

Second, the high risk for the concessionaire of not being able to charge and collect adequate wastewater treatment tariffs can be reduced con-

Table 4.4. Reduction of Risk in a Wastewater Treatment Project Cash Flow

Item	*Type of risk*	*Reduction of risk*
Volume of wastewater treated	Market	Sewerage connections
x Average tariff for wastewater treatment	Market/ political	Explicit regulation
= Gross operating revenue		
– Operating expenses	Operational/ technical	Prequalification of operators and simple technology
= Gross internal cash generation		
– Interest payments	Financial	Fixed interest through swaps
– Amortization of loans	Financial	Long-term loan refinancing guarantees
– Income taxes	Political	Explicit contracts
– Complementary investments	Construction	Hiring of qualified contractors
– Dividends paid to investors	Political/ transfer	Guarantees of repatriation
= Surplus for concessionaire/investors		

siderably by establishing a transparent and rational legislative and regulatory framework. Tariffs should cover both investment and operating costs as well as compensate sponsors adequately for assuming risks. The risk that consumers will not be willing to pay the higher charges always remains, of course. As a rule, however, the concessionaire will sign a contract with the municipality and will then assume municipal risk. This municipal risk can be mitigated through the establishment of escrow accounts that will serve as a buffer for payments to the concessionaire in case the municipality's capacity to pay slips.

Third, the risks of unexpectedly high operating costs or effluent standards that do not meet the contract can be reduced in several ways. For example, the risk that operating costs will be unexpectedly high can be reduced by requiring the use of simple or well-tried technologies rather than accepting experimental or untried ones. The risk that contractual effluent standards will not be met can be reduced by requiring operators to be prequalified.

Fourth, financial risks can often be reduced by using risk management instruments such as interest swaps. However, such financial instruments can become prohibitively expensive in high-risk countries with poorly developed financial markets. Fifth, contracts should be explicit about the income tax obligations of investors and concessionaires in order to avoid unexpected taxation. Sixth, the substantial construction risk can partially be controlled through careful pre- and post-qualification in order to ensure that only experienced contractors are used.

Allocation of Risks

After risks have been reduced through a series of judicious measures, any remaining risks have to be allocated between the different parties on the public and private sides of the BOOT contract. In a simplified form the two main sides are that of the private concessionaire and that of the government, meaning either the national government or provincial or municipal governments, as dictated by the constitution or administrative legislation of the country. Table 4.5 suggests ways to allocate risks following the principle of assigning risk to the party best able to manage the particular kind of risk.

The (medium) risk of not having a sufficient volume of wastewater to be treated could be assigned to the concessionaire. The concessionaire, in turn, may attempt to share this risk with the government by demanding a take-or-pay arrangement in which the client pays for a given volume of wastewater treated whether it is delivered to the plant or not. The concessionaire will also typically demand a release from meeting

Table 4.5. Allocation of Risk in a Wastewater Project Cash Flow

Item	*Type of risk*	*Allocation of risk*
Volume of wastewater treated	Market	Concessionaire
x Average tariff for wastewater treatment	Market/political	Government
= Gross operating revenue		
– Operating expenses	Operational/technical	Concessionaire
= Gross internal cash generation		
– Interest payments	Financial	Concessionaire/lenders
– Amortization of loans	Financial	Concessionaire/lenders
– Income taxes	Political	Government
– Complementary investments	Construction	Concessionaire
– Dividends paid to investors	Political/transfer	Investors
= Surplus for concessionaire/investors		

the contractual effluent standards if the characteristics of the incoming wastewater are substantially different from what has been stipulated.

The (high) risk of being able to charge adequate tariffs will need to be assigned to the government. This is a risk that the private concessionaire is unable to control. After all, it is the prerogative of the government to establish and ensure that tariff legislation is implemented and adequately regulated. The concessionaire should assume the (lower) risk that the client, often a municipality, will not pay the billings. However, in practice the concessionaire will often seek to pass this risk along to the central government because the payments risk in developing countries is high given the low and unreliable revenue base of many municipalities.

The fact that the government needs to guarantee the policy and implementation of the tariffs charged does not mean that it guarantees a certain level of revenue. The concessionaire should still be responsible for the commercial risk of not being able to capture a sufficient volume of wastewater to treat and for the risk that it will not be able to collect the corresponding charges. In practice, investors and operators often seek to transform the government guarantee of a tariff policy into a de facto government guarantee of a minimum level of revenue.

The (medium) risk of controlling the level of operating costs should be assigned to the concessionaire, which possesses superior experience in managing this risk. In turn, the concessionaire may involve, as part of

a consortium of concessionaires or through subcontracting, an experienced operator in order to pass on the technical operating risk. The risk of receiving wastewater of different characteristics than contracted will likely be passed on to the client through the BOOT contract, with stipulations that free the concessionaire from the risk of any resulting damages or the failure to meet contractual effluent standards.

The financial risks related to the level and profile of interest payments and amortization of borrowings should be borne directly by the concessionaire and indirectly by the lenders to the project. The government should not bear this risk because the prime rationale for involving the private sector under a BOOT contract is precisely to avoid using the government's limited room for extending guarantees.

The risk that changes in tax legislation will adversely affect the project's cash flow is political in nature. Only the government can manage this risk and should logically bear it. Tax legislation should be clearly spelled out in the BOOT contract in the interest of both parties.

The construction risk should clearly be borne by the BOOT concessionaire. Often, the concessionaire will pass on this risk to an experienced construction company that is contracted to build the treatment plant under a turnkey arrangement. The construction risk is substantial for water supply and sewerage projects. A review of 120 World Bank–financed water supply and wastewater projects reports that the average expected cost overrun for these projects was 25 percent (World Bank 1992). These projects were implemented by public water and sewerage agencies, for the most part with private contractors. The public sector's poor record of controlling construction risk is a major reason in favor of switching to private BOOT contracts. Logically, the entire risk should then be borne by the private concessionaire in order to provide an incentive for timely, efficient, and within-budget construction.

Finally, the transfer risk that foreign investors or operators may not be able to change local currency to foreign currency should be borne by the government, which is in the best position to implement macroeconomic policies that will enable investors and operators to repatriate equity and profits. In turn, foreign investors could purchase insurance from bilateral and multilateral agencies (such as the World Bank Group's Multilateral Investment Guarantee Agency) against the risk that the government's macroeconomic policy will fail.