

# **Water in Porto Alegre, Brazil**

**- accountable, effective, sustainable and democratic -**

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**By**

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**Prefeitura de Porto Alegre  
ADMINISTRAÇÃO POPULAR**

## Foreword

*Carlos Atílio Todeschini , DMAE's General Director*

In 2001, in Brazil, there was an intensive fight against the privatization of water and sanitation, where the Brazilian people were the winner. The federal government initiated the attempt with proposed legislation. Trade unions, city mayors, Deputy Chamber, NGOs, corporations, community organizations, the Church and other instances of the civil society successfully resisted this legislation, which would represent the turning point, permitting that State and Municipally owned companies could be acquired.

Unfortunately, this same success was not replicated in other countries. The International Financial Institutions - the IMF, World Bank, Inter-American Development International Bank and their collaborators, pressure many governments especially in developing countries to withdraw from the public sector . The justification for these actions is the notion of "efficiency" from private enterprise, the need to adopt the "free market", the need for " social cost reduction," greater "labour flexibility" and "tariff reductions with better quality services".

What is proven is the tragedy of privatization of essential services. Exorbitant costs, social exclusion, authoritarianism, hunger and, as consequence, the reappearance of diseases before now under control, such as dengue hemorrhagic fever, typhoid fever, cholera, hepatitis and even tuberculosis.

*Hans Engelberts, PSI General Secretary*

Public Services International, the global federation of 20 million public sector workers, is proud to be associated with this study of the water and sanitation company, DMAE, of the city of Porto Alegre, Brazil.

DMAE presents one of the many success stories of the public sector in developing countries. However, these stories don't reach decision makers around the world, and so their value is lost. The only thing we hear, especially in the debate over water, is the hopelessness of the public sector, and the inevitability of privatisation. But in many instances, thanks to the work of dedicated public servants and support from the community, public water companies are thriving and are living up to the expectations of citizens.

For all organisations concerned about the unbridled privatisation of water systems, the example of DMAE provides a solid reference of quality public services. DMAE has mastered the critical governance and finance aspects of running a large public enterprise in a developing country. It developed and masters sophisticated technical expertise.

But most important are DMAE's participatory management systems which systematically involve members of the community in its decision-making, and which enable true access and transparency. Because DMAE is founded on the ethos of public service, to all citizens, equitably and efficiently.

Let this be the benchmark used by the World Bank and national governments as they seek to reform public enterprises. Let this be the model advocated at the World Summit on Sustainable Development in Johannesburg.

ABBREVIATIONS	
PSIRU	Public Services International Research Unit
NGO	Non-Governmental Organization
IMF	International Monetary Fund
UNDP	United Nations Development Program
IADB	Inter American Development International Bank
PLC	Public Limited Company
DMAE	Municipal Department of Water and Sanitary Sewage
DVC	Revenues Division
DVT	Treatment Division
DVA	Water Division
DVE	Sewage Division
DEP	Urban Drainage Department
DMLU	Municipal Urban Cleaning Department

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# 1 Introduction

## 1.1 Summary

This report presents how the water and sewerage services in Porto Alegre, Brazil, are operated, through the city council's Departamento Municipal de Água e Esgoto (DMAE – Municipal Department of Water and Sanitary Sewage).

There are three main sections, covering the main issues of accountability, performance, and finance:

- The first section covers the structure and constitution of DMAE, the system of accountability, and the extent of transparency.
- The second section looks at the performance, management practices and technical efficiency of DMAE.
- The third section looks at financial issues, principally the financing of investment and pricing policies.

Finally, it looks at other aspects, notably the support offered by DMAE to other water operators.

## 1.2 Authors and publishers

This report is jointly written by PSIRU, University of Greenwich, and by staff of DMAE, and jointly published by DMAE and Public Services International (PSI).

It arises from over 40 years experience of water and sanitation service delivery by DMAE itself, the participatory budgeting developed by the city council of Porto Alegre, and specifically from a paper written by DMAE staff for Wateraid, as part of their research project on private sector participation in water in developing countries (see <http://www.wateraid.org.uk/research/psp-icf.html>). We are grateful for Wateraid's permission to use some of the material from that report.

It also grows out of PSIRU's work on water, which has presented the evidence of the unsustainability of private operations in water and sanitation, and the need to address the potential of public sector delivery, summarised in the report "Water in Public Hands" ([www.psiru.org/reports/2001-06-W-Public.doc](http://www.psiru.org/reports/2001-06-W-Public.doc)). PSIRU hopes to produce other papers on 'working models' in public sector water.

## 2. Background – Porto Alegre

### 1.3 Porto Alegre – a successful city

Porto Alegre City prides itself for having the best quality of life in Brazil,<sup>1</sup> according to the human development index created by the United Nations Development Program (UNDP). Between 1991 and 1995, the city scored an index of 0.736, which is remarkably high especially in comparison to similarly sized cities in developing countries. In 1999, this rose to 0.792, which is comparable to the typical 0.80 rating obtained by capital cities of developed countries<sup>2</sup>. This index is derived from a number of basic service indicators – e.g. literacy, education, health, etc. In 2001, Porto Alegre for the second consecutive year has been adjudged first among twelve other regional capitals.

Water supply and sanitary sewage systems play a key role in Porto Alegre's high ratings. The city for instance, has one of the lowest rates of infant death in the whole country: 13.8, as compared to the national infant mortality rate of 65 deaths per thousand births. There is a direct correlation between low infant mortality and improved levels of water and sanitation. The city water system is able to serve 99.5% of the population today, at a price of R\$1.0656 (~US\$ 0.3552) per 1000 litres, one of the cheapest in the country. The utility collected raw sewage from approximately 70% of households in 1990, growing to 84% in 2001. In 1990, only 2% of this collected sewage was treated; today this has grown to 27%. The city government is currently negotiating a loan to be used for increasing treatment of sewage to 77% within five years.<sup>1</sup>

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<sup>1</sup> Porto Alegre City was adjudged as having the best quality in Brazil in a survey done by *Dirigente Municipal*, an important national magazine. (Vision Group, 1989-90)

<sup>2</sup> Data from research undertaken by UNDP in partnership with Institute of Applied Economic Research.

#### **1.4 History of water service in Porto Alegre**

The history of water and sanitation services in Porto Alegre shows the typical pattern of development, with private contractors starting services in the 19<sup>th</sup> century, being taken over by municipalities in the early 20<sup>th</sup> century.

In 1861, a private company, Hidráulica Porto-alegrense, was awarded a contract for the operation of the city's water supply. At the same time Companhia Hidráulica Guahybense was set up to serve the unconnected neighborhoods. Cholera epidemics of 1857 and 1876 persuaded the municipality to provide sanitation services, but the first part of the urban sewerage system was only completed in 1912. In 1904, the city council took over Companhia Hidráulica Guahybense, and later Hidráulica Porto-alegrense (DMAE, 2001a, p. 19), and created an administrative department of the city council.

In 1961, Porto Alegre city council decided to transform the water department into an autonomous and financially independent municipally-owned undertaking, the Departamento Municipal de Água e Esgotos - DMAE), as. This decision created the first key feature of DMAE, its autonomy from the general budget of the municipality.

The decision was taken to allow DMAE to obtain a US\$ 3.15m loan from the Inter-American Development Bank (IADB). The IADB would lend the money only at certain conditions: the loan had to be spent exclusively on investment in sanitation services; the borrowing entity had to be autonomous, self-sufficient and with its own separate accounts (Pereira, 1991, p. 59). Those conditions were aimed at ring-fencing and ensuring repayment of the loan (Costa, 1981, p. 64). With the loans on hand, the Menino Deus Water Treatment Works was built. It was inaugurated in 1968. In the same year the water tariff changed from being a property tax, related to the value of the building, to being linked to water consumption.

#### **1.5 The Brazilian context**

Brazil is a federal country, with 27 states with their own elected governments, and elected municipalities in the cities and towns. Water is partly provided by the large regional state water companies, and partly by municipalities. Some 3800 Brazilian communities (out of 5517) are served by the state companies - which are public limited companies (PLCs, the equivalent of joint stock companies in US law) - while the remaining communes are served by municipally-owned undertakings or by co-operatives. In the whole country, in 2002, only 38 water companies had been privatised – 17 totally, and 21 partially. Out of 27 state capitals, 25 are served by public companies - 23 regional and 2 municipal – and 2 are served by partly privatised companies.

DMAE is the largest municipal water undertaking (Ilha *et al.*, 2001). In other state capitals the water is supplied by state companies. These regional companies enjoy the potential advantages of economies of scale. However, DMAE is a clear example of how a municipally- owned undertaking may achieve efficiency and outstanding performance without changing its status and ownership. In this sense, transparency, accountability and public participation appear as the catalyst for DMAE's success and call for attention to its institutional structure.

## **2 Accountability, transparency and public participation**

### **2.1 DMAE as an autonomous municipal organisation**

Despite being wholly owned by the municipality of Porto Alegre, DMAE enjoys

- separate legal personality from the city council,
- operational autonomy and
- financial independence.

As an autonomous public body, it is a separate entity from the municipal government, and can make its own decisions on how to invest revenues it collected, and such decisions are not directly subject to interference or deliberation by the municipality. But the city government retains significant power, since the Mayor appoints the Director-General of DMAE, and the representatives on its Deliberative Council.

DMAE's institutional status as an autonomous but wholly municipally owned organisation is similar to that found in a number of European countries, including Germany, Italy and France. It is close to the French municipally- owned *régies à personnalité morale et autonomie financière*, for example, which are also accountable to civil society through the representation of different groups and organisations within its governing bodies. In the terminology of the European Union, it would be regarded as a trading body, and so its borrowing and debts would not be counted as government debts for the purposes of monetary control.

### **2.2 Financial independence**

DMAE's finances are ring-fenced – so it receives no subsidies, and makes no payments to the municipality itself, not even to cross-subsidise other public services. The only sums transferred to the municipality are to pay for services provided by other departments, whose charges are collected through the water bill, as is the case for rainwater drainage, for example. As a result DMAE has to be financially self-sufficient, covering all its expenses from its own income. It produces its own accounts, separate from the municipality.

DMAE's distinct legal personality and financial self-sufficiency allow it to borrow the required investment finance without the support of the municipality – this was the original point of creating DMAE in 1961. DMAE pursues a no-dividend policy under which all profits made are reinvested into the system. The founding statute specifically required DMAE to reinvest 25% of its yearly revenues.

As a municipal undertaking, DMAE enjoys tax-exempt status – unlike PLCs - which allows it to keep lower water prices only to fit current expenses and investments. DMAE is also exempt from a number of taxes levied on state water companies and transferred on to consumers through pricing. For example, those include profits tax and social dues, both calculated on the basis of profits, and the contributions to social security (COFINS), calculated on the basis of expenses.

### **2.3 Management structure**

There are three key elements in the management structure of DMAE.

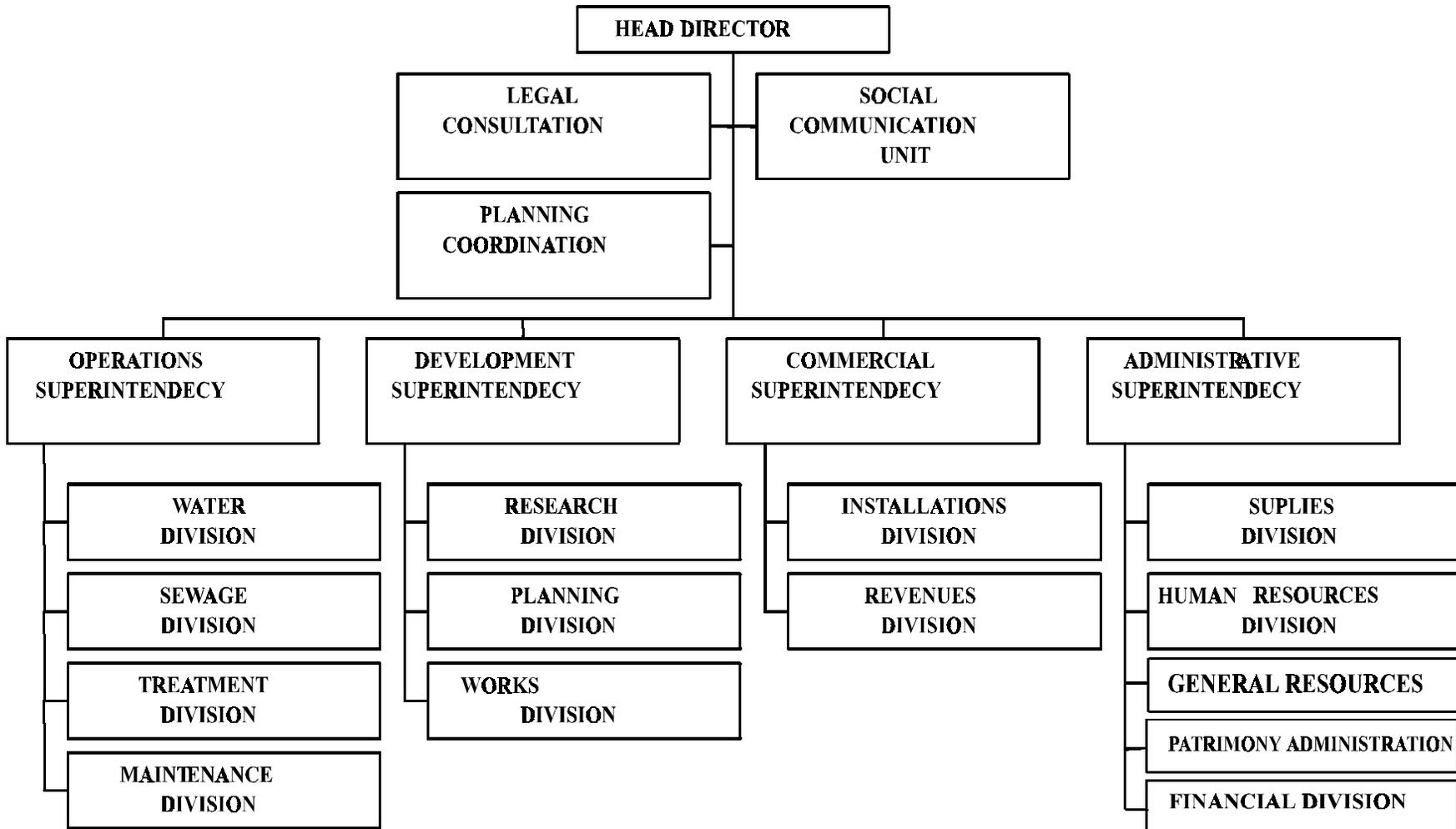
First is the general management, headed by the Director-General (*Diretor Geral*), who is appointed by the Mayor of Porto Alegre, to a four year turn.

The director-general in turn appoints senior managers among the Department staffs, composing the so-called Technical Management Council.

He also has the option to hire to the Department staff during his term, about 25 people, which stick with his management principles. They are spread all over the Department, and eventually some of them can be nominated as senior managers. All other posts are publicly advertised and selected. All salaries have to be approved by the municipality.

The Technical Management Council (*Conselho Técnico Gestor*), consists of the CEO meeting weekly with the management (up to 30 people), being responsible for analysing projects and internal works of the Department, discussing annual budget and deciding the priorities. Herewith it also provides advice and technical support and information to the Deliberative Council.

# DMAE Structure



Finally, and most importantly, there is the *Deliberative Council (Conselho Deliberativo)*, which controls and approves all operations and decisions taken by DMAE, exercising some oversight and de facto final management functions. The minutes of the meetings are openly circulated. A more detailed account is given in the next section.

In addition to these management structures, DMAE is subject to two further forms of accountability. First, it is subject to audit. Secondly, it is expected to reflect the popular will on the allocation and reinvestment of its revenues, as expressed through the Participatory Budget (*Orçamento Participativo*), discussed in greater detail below.

## 2.4 Deliberative Council

Chaired by DMAE's CEO, the Deliberative Council is the equivalent of the Board of Directors (Petersen *et al.*, 2001). The Deliberative Council has the power to approve all major decisions to be adopted by DMAE, as well as to advise on a number of secondary matters (DMAE, 2001a, p. 27).

The Council is made up of representatives of different civil society organisations, reflecting different political views and interests so as to introduce a number of checks and balances in DMAE's management. This feature of the Council is generally regarded as vital to ensuring its ability to enhance the company's accountability, and despite the different political views of its members there have never been politically dictated divisions on technical issues such as rate increases.

The composition of the Council is the following, with one member for each of the represented organisations:

- a) Commerce Association of Porto Alegre
- b) Engineering Society of Rio Grande do Sul
- c) Industries Centre of Rio Grande do Sul
- d) Federal University of Rio Grande do Sul
- e) Lawyers Institute of Rio Grande do Sul
- f) Porto Alegre Municipal Employees Union
- g) Press Association of Rio Grande do Sul
- h) Economy Society of Rio Grande do Sul
- i) Department of Statistics and Social-Economics Studies
- j) Medical Association of Rio Grande do Sul
- k) Environment Protection State Association
- l) Union of Porto Alegre Neighborhood Association
- m) Union of Real State Intermediary and Administration of Condominiums of Rio Grande do Sul

The members of the Council and their substitutes are appointed by the mayor from a list of three nominations for each of the organisations represented. Members remain in office for three years and 1/3 of members are renewed yearly. The Council meets weekly, and has a quorum of 7, and convenes for extraordinary meetings, if requested by its Chairman or decides appropriate to do so.

The Council is responsible for approving works plans; tenders; contracts and agreements entered into by DMAE; water supply and sanitation tariffs; budgetary proposals (*proposta anual de orçamento*); annual financial reports (*informe econômico financeiro*); financial operations; divestiture of property and unusable material; the company's policy on personnel and human resources, when requested by the CEO. It should be noted that these powers do not cover the contracts with DMAE's employees.

Again, this structure is similar to that of the French *régies à personnalité morale et autonomie financière*. The members of the Board of Directors of a *régie* are appointed by the city council for 6 years (the same period as city councillors); up to a maximum of 1/3 of members are appointed from municipal councillors, with the remaining members representing civil society (Source: Régie des Eaux de Grenoble).

Another example of a similar structure can be seen in the Philippines' Water Districts, where the company General Manager is accountable to a Board of Directors whose members represent civil society interests (civic clubs, business, professional, education, women's organisations) – but unlike DMAE's Deliberative Council, the Water District's Board of Directors have the power to appoint and dismiss the General Manager (Braadbaart, *et al.*, p. 158).

## 2.5 Participatory Budgeting (OP)

The Participatory Budget process (*Orçamento Participativo*) is a form of direct democracy, allowing citizens to participate in the neighbourhood they live in or within a particular thematic area and choose which of their priorities the municipality should implement. This process is not limited to the water sector but applies to all the activities of the municipality of Porto Alegre and the state of Rio Grande do Sul.

It originated in 1989 when a new local government was elected, committed to a programme of tax reform and expenditure, which started using public meetings to ensure broad support for the implementation of this programme. Over time, the process consolidated into a more formal *Orçamento Participativo* or OP (Participatory Budgeting).

Decisions made within OP produced significant effects in increasing municipal revenue. Unlike most municipalities in Brazil today who are dependent on national government resource allotments, municipal revenue in Porto Alegre constitute more than 50% of the total. This has come mostly from easier identification of where the taxes would specifically come from, and how they are spent. Because the application of these resources is defined by the population, it has become easier to rely on the well-defined tax base of Porto Alegre.

Participation in the OP is voluntary and universal. Any citizen, whether or not a member of organizations such as parties, religious, neighbourhood associations – can participate in the process. Every citizen that participates is entitled to vote in the selection of the priorities and the selection of representatives.

OP is a deliberative and transparent process, decisions made are documented, published and strictly implemented. The documentation of the decisions is presented in the “year end” report, which allows the public to monitor the implementation of the decisions made within OP. Billboards are placed in the city centre showing how the budget was spent, and how projects appropriated for were implemented. The information is now made available on the Porto Alegre City website as well. This allows for social control of the population over the government.

Finally, the internal rules of the OP are established by participating citizens, making the process self-regulating. The participating members may change the rules in order to improve its performance and to ensure that it remains relevant. The purpose is to guarantee the independence of civil society in its relationship with the State. This gives the participating citizens power and liberty to control the actions of the government.

These features of the OP had fostered the emergence of a non-state public sphere. As in many poor countries, state institutions in Brazil including banks and state corporations, have historically attended mostly to private and particularistic interests, and not to the general public welfare. There never has been a real public sphere in the sense of a space where society can see and evaluate itself. As a result of participatory budgeting there is *co-administration* of the city by city government structures and the council of the OP. Extra-state institutions emerge, allowing for social control over government actions.

Initially, participation was low until the tax reform began to produce results, and now the number of people that participate in the OP is growing year after year, and the number of Associative and Resident Entities registered in the OP process today number about a thousand.

The OP allowed people to identify which demands or projects should be attended first. Priorities became more reflective of the needs of the communities, which is a direct opposite of priorities established by previous governments. It is one reason why 99.5% of Porto Alegre’s population now enjoy treated water, 84% - the highest in Brazil – are connected to sewerage, and 27% has treated sewerage.

## 2.6 Participatory budgeting in water

In relation to water supply and sanitation in Porto Alegre, the Participatory Budget takes place in the 16 neighbourhoods in which the city is divided. Citizens meet to vote on what of their priorities the available resources should be invested, with each of the short-listed priorities being evaluated on a cost/benefit basis. Citizen meetings take place in three rounds, with a total of 51 meetings per year. The Participatory Budget meetings take place under the guidance of DMAE, which explains the technical criteria for the selection and implementation of works, but are also an occasion for DMAE to be exposed to the criticism and suggestions of the public.

Once citizens have made their decision on the priorities for investments, the technical feasibility of such decisions are analysed by DMAE according to a set of criteria approved by the Participatory Budget Council (*Conselho do Orçamento Participativo*). On the basis of the decisions made through the Budgetary Process, DMAE elaborates an investment plan, which requires the approval of the Participatory Budget Council, not only from the technical but also from the financial point of view.

Following the adoption of the investment plan, a number of commissions are set up within the Participatory Budget Council to monitor the implementation of the works until completion. In the year 2000, 38 “accompanying” commissions were established and the number was expected to rise to 41 in 2001. In 2000, 250 surveys were carried out to examine the ongoing expansion of the water supply and sanitation network asked by the Participatory Budget (DMAE, 2001, p. 54).

## **2.7 Transparency and participation**

The transparency and accountability of these structures is remarkable. All decision-making processes are effectively open, from the weekly - whose minutes are circulated, through the Deliberative Council, which is directly accountable to civil society groups, and the investment planning process of the Participatory Budget system itself. The municipality remains in the background, though it appoints the key decision-makers in management and the Deliberative Council, and drives the participatory Budget process. Despite this, DMAE is clearly accountable not only at top level but also to the public it serves.

The structures may be contrasted with those of many public systems, and even more so with private concessions. In most private concessions even the terms of the concession contract remain a commercial secret, the meetings of directors are secret, and do not include representatives of civil society. Some private companies, such as Suez, claim that they encourage community participation, but not on the board of directors of its water companies: and no private company offers its entire investment planning and budgetary priorities for public debate and decision-making through a mechanism like the Participatory Budget of Porto Alegre.

The Deliberative Council and the Participatory Budget are also well designed to address and deal with potentially conflicting interests. With the direct and continuous involvement of the population through the Participatory Budget, social control is exerted over the water undertaking, and there is a dialogue between consumers and service providers, which enables the creation of a collective awareness of how to achieve and maintain a sustainable water system.

The Porto Alegre system thus ensures a level of accountability and transparency which breaks down the “asymmetry of information” between regulated and regulator, the adverse incentives of the profit motive and the imbalance in power and resources between the operator and the conceding authorities.

The system has been described as meeting three key public objectives: people’s need for a sustainable service, the acquisition of a concern for the sustainable use of the natural resources, and the permanent engagement of citizens in the management of public funds”.

## **3 Performance, efficiency and service delivery**

### **3.1 Coverage**

Porto Alegre has nearly doubled in size from some 700,000 inhabitants in 1961 to 1,360,000 in 2001 (Ghisleni, 2001; DMAE, 2001, p. 15). Over that period DMAE has considerably extended service coverage and improved service quality.

Expansion of service coverage has been and, at least for sanitation, remains a priority in Porto Alegre. In 2001, DMAE provided water supply to 99.5% of the population, an increase from the 95% supplied in 1990. The remaining 0.5% of the population is not connected to the network as resides in illegal settlements, areas subject to geological risk or liable to flooding, environmental preservation areas etcetera and is supplied – by DMAE - with water by tank trucks.

In 1990, DMAE provided sewerage services to some 70% of households, and by 2001 it had extended service coverage to 84% (Source: Rochefort, 2001, 10-13\*\*\*).

Wastewater treatment increased from 2% in 1990 to 25% in 2001 and is expected to reach 27% at completion of the R\$ 8.1m Belém Novo treatment plant presently under operations start. Furthermore,

DMAE is negotiating a loan to finance the expansion of wastewater treatment up to 77% in five years with the construction of the R\$270.3m Serraria wastewater treatment plant (this investment also cover expansion of the present sewerage network to collect partially, and treat all wastewater produced by the central and southern areas of the city, as well as relocation of dwellers living in dangerous areas).

In the last 12 years, DMAE has expanded the sewerage network according to the priorities indicated by the population through the Participatory Budget, including in low-income areas. In the last 10 years, a number of wastewater treatment plants have been built to improve sanitation and clean up Lake Guaíba: Lami, Ipanema and São João-Navegantes. While the Lami plant became operative in 1992, the R\$ 5m Ipanema plant started operations in 1997 allowing to increase wastewater treatment to 15% through biological treatment. The R\$ 24.4m São João-Navegantes plant started operations in 2000, allowing to increase wastewater treatment to 25%. Once the Belém Novo plant starts operations, 27% of Porto Alegre's population will be served with secondary sewage treatment

### 3.2 Leakage

Unaccounted-for-Water (UFW) in Porto Alegre has been declining, from some 50% in 1991 to roughly 34% in 2001, as shown by the table below:

Year	Produced water	Accounted water	Unaccounted-for- water (UFW)
1991	193,871,691	96,221,441	50.37
1992	200,843,423	101,523,337	49.45
1993	194,457,985	102,976,817	47.04
1994	197,417,119	105,999,913	46.31
1995	206,870,343	110,793,100	46.44
1996	207,105,704	114,920,722	44.51
1997	202,447,254	123,216,167	39.14
1998	196,419,656	119,398,248	39.21
1999	189,536,306	120,108,824	36.63
2000	183,759,193	119,935,719	34.73
2001	176,324,850	115,724,097	34.37

Sources: DVC, DVT, DVA, DVE, DEP, DMLU e Fire Dpt.

It should be noted that the way of calculating UFW changed in 1995. As of 1990 UFW was calculated only on the difference of distributed water and invoiced water (on the basis of meter reading). The methodology for measuring UFW has been refined in order to take into account a number of factors, in addition to mere meter reading. More precisely, the new methodology takes into account water consumption by non-metered households (consumption estimate from the difference between the total of existing connections and the connections that were read); water provided by tank trucks to non-connected households; water used to unblock sewers and wash filters and decanters; water used by the Municipal Urban Cleaning Department (DMLU) for street clean cleansing; and water consumed by the Fire Brigade via hydrants.

As a result, the computation of UFW is now the sum of leakage, consumption by illegal connections, sewer cleaning and public uses not-invoiced for.

Besides the change in calculation method, other components have contributed to the decrease observed. From 1996 on, a Water losses management program was created, which consists of:

- Replacing old water pipes in bad operations conditions, which is under a long term program that establishes a 50km per year substitution;
- Installing oversized meters in the raw water intake at the Water Treatment Plants (ETA's);
- Share of the water network by supply areas of the city and installation of flow measuring sectors;
- Automating Pumping Stations;
- Regularization of illegal connections;
- Improving submetering equipment.

### 3.3 Labour

In October 2001 DMAE employed 2,453 workers, a low figure which is partly a result of contracting out of works.

This gives a ratio of about 3 employees per 1000 households served with water and sanitary sewage, which is close to the ratio in the USA (2.7) and lower than the ratio for Paris (4.5), where water is run by the multinationals Suez and Vivendi) (source: Blokland et al (Ed.) Private Business, Public Owners – Government Shareholdings in Water Enterprises. Ministry of Housing, Spatial Planning and the Environment of the Netherlands (1999)).

#### 3.3.1 Basic education

In partnership with the municipality of Porto Alegre, DMAE is running an educational program since 1998 aiming to eliminate illiteracy among employees. Up to 800 of DMAE's employees were illiterate or partially literate. Up to 2001, 50% of these employees took part to DMAE's educational programme but, following numerous requests, this is in the process of being extended so that all workers become literate to at least primary grade. DMAE's educational programme aims to promote the employee's skills and general knowledge, to value the employee as a citizen and worker and to enhance his/her self-esteem to his/her personal and professional enhancement.

#### 3.3.2 Training

In 2000, a total of 143 training courses were run by DMAE, involving 1,819 workers for a total of 3,833 hours of classes. Training covered technical/operational aspects (82%), as well as administrative (5%) and managerial issues (13%) (DMAE, 2000, p. 7).

#### 3.3.3 Computing Training

In partnership among HR Development Section and Computing Section, DMAE runs a program aimed at enhancing the employees' computing skills, with courses tailored to their specific professional requirements. In 2001, 131 workers attended classes (DMAE, 2001, p. 43).

#### 3.3.4 Complaints and suggestions

Since July 2000, an office (*Ouvidoria Interna* – literally, internal hearing) receives workers' criticisms, denounces, suggestions, requests of clarification or information, and other comments. The office then contacts the competent department of DMAE for this to provide an answer to the interested worker. The office is aimed at providing a space for the defence of workers' rights and encouraging dialogue between the employer and the employees. The office is intended to constitute an independent channel for workers.

### 3.4 Efficiency

Since 1996, DMAE has introduced automation ("*automação*") as a way of reducing operating costs and optimise water supply and sewerage systems. Automation also reduces human error; reduce the costs of electricity, chemicals and maintenance; allows the removal of employees from unhealthy sites; guarantees a longer life of the equipment; improves control of drinking water; allow the rapid detection of leaks and faults in plants, facilitating interventions and reducing the time of interruptions in water supply (DMAE, 2001, p. 39).

DMAE is evaluating the possibility of supplying raw water for non- human consumption to industrial and commercial users as a way of saving on treatment and optimising water uses (Ilha *et al.*, 2001)

DMAE contracts out construction and other works through competitive tender, including:

- Water connection services;
- Sewage connection services;
- Paving recovery;
- Transportation services;
- Machinery and equipments rental;
- Vehicles rental;
- Data processing services.

The majority of works contracted out are awarded to Brazilian companies (around 95% including a small amount of works carried out by local subsidiaries of foreign multinationals, such as Suez

ONDEO Dégremont). DMAE has no vested interest in favouring vertically integrated foreign subsidiaries.

### 3.5 Service quality

While expansion of service coverage has been the primary priority in DMAE's activity, the company has also improved service quality, most notably in water supply. An example is the construction of the R\$ 2.7m São José pumping station, completed in 2001 to supply a neighbourhood located on a steep hill. In 2001, the R\$ 300,000 Nonoai I pumping station started operations improving the regularity of water supply to a relatively high area of the city. These works have also a social impact as increasing numbers of people are settling in more hilly areas around the city instead of the Lake Guaíba margins as a result of increased urbanisation and poverty (Ghisleni, 2001)

As regards the monitoring of drinking water quality, each month DMAE analyses 3,000 samples of water taken from over 280 points along the pipeline network and at water treatment stations (DMAE, 2000, p. 11).

### 3.6 Demand management

Water consumption in Porto Alegre has decreased from 1997 onwards DMAE regards the progressive tariff structure as an effective demand management tool, as increasing individual consumption may imply ending up higher block tariffs. But what seems to have contributed most to the reduction in water consumption are the public campaign run by DMAE to build awareness on the need to conserve water in order to avoid wastage and eventual rationing. Reduced water consumption has exerted pressure on DMAE's finances, as the ensuing reduction in revenues has not been accompanied by a proportionate reduction in costs. Again, public ownership appears to have favoured the adoption of alternative approaches to demand management, mainly dictated by public interest rather than commercial considerations

Table 1 **Volume of accounted water (m<sup>3</sup>/ month)**  
1995/2001

Year	Accounted Water (m <sup>3</sup> /month) Yearly average
1995	9,099,994.08
1996	9,123,140.92
1997	9,423,496.92
1998	8,934,423.08
1999	9,056,081.00
2000	8,914,904.83
2001	8,525.411.27

Sources: COP and SC

Note: The values refers to submetering data.

Table 2 **Water Prices and Average Consumption**

Date	Water price (m <sup>3</sup> ) (R\$)	Exchange Rate (US\$)	Water price (m <sup>3</sup> ) (US\$)	Average Consumption m <sup>3</sup> /household /month
Mar/97	0.5740	1.0627	0.540134	20.12
Mar/98	0.6120	1.1427	0.535574	18.71
Mar/99	0.6456	1.722	0.374913	18.47
Mar/00	0.7561	1.7473	0.432725	17.63
Mar/01	0.8254	2.117	0.389891	16.37
Mar/02	1.0656	2.3236	0.458599	15.82

Sources: COP and DVC

Note: Considered that each household is equivalent to four persons in average and the values refers to submetering data.

### **3.7 Environmental management**

DMAE is responsible for protecting water courses running within the municipality from pollution. Its own sewerage operations are one of the greatest problems, as raw sewage is discharged into Lake Guaíba which is at the same time the major water source of the city. Apart from obvious benefits in terms of improved public health and environmental enhancement, increased wastewater treatment will allow to reduce the costs of raw water treatment.

DMAE has embarked on an ambitious program to restore safe bathing along the shores and beaches of Lake Guaíba. The first results are about to be seen, as of December 1992 at Lami beach. DMAE expected to ensure safe bathing in beaches like Belém Novo by the end of the year 2002, since that ETE Belém Novo is under operation start. The same objective would have been achieved in Ipanema after five years from the beginning of the ETE Serraria construction, which is under negotiating. Environmental management also requires a long-term vision and therefore the education of citizens to environmentally-responsible behaviour. This takes place through awareness raising campaigns supported by media, entertainment and cultural events (including lectures), aimed at schools, the general public and DMAE's employees. In 2000, DMAE's environmental education team visited a total of 3,508 pupils of different ages in Porto Alegre's public and private schools (DMAE, 2000, p. 11).

### **3.8 Customer relations**

DMAE has set up a free phone line allowing customers to signal problems in the water supply and sanitation system and put forward complaints. The average time of intervention is 24 hours following a phone call signalling problems, but in case of supply interruptions water supply is re-established in 18 hours on average.

The free phone line, which receives approximately 1,500 calls a day, also has other functions. For example, it is used to provide information on the price of services offered by the company (e.g. connection and disconnection to the network, installation and replacement of water meters, re-establishing water supply, replacement of sewers, unblocking sewers, cleaning septic tanks, mains repair and additional inspection), and to pass on reports of problems to the municipal departments responsible for rainwater drainage and roads.

In addition to the free phone line, customers can call DMAE on a conventional line in order to receive clarifications on their bills and on services provided by DMAE. Customers can also contact DMAE via the Internet.

In November 2001, opinion analysts META – Research and Opinion carried out a survey on customer satisfaction with services provided by the municipality of Porto Alegre. DMAE stood out as the most popular of municipal service providers. Water supply received an approval rate of 88% (good-very good), while the approval rate for sewerage was 53%.

### **3.9 Public service**

DMAE's performance on the key issues of coverage and demand management are interesting examples of how public sector organisations may have positive advantages. The increase in coverage is a clear public commitment, reinforced by the OP, which enables DMAE to deliver it confident that the public is prepared to finance it. The ambitious target for sewage treatment will test this, but the economic advantage of DMAE is that there are no possible competing claims for the company's surplus as there are with multinational companies e.g. dividend payments to shareholders, or investment in other company ventures: DMAE by contrast is obliged to reinvest all its surplus.

Again, the use of public education as a tool for demand reduction is a way which the public sector is in a much better position to use (the experience in the UK in drought of 1976, under public ownership, as that consumption fell by 25% in response to public appeals; but in the drought of 1995 in Yorkshire, under private ownership which was widely regarded as greedy, demand fell very little in response to the company's appeals)<sup>2</sup>.

## 4 Finance and pricing Policy

### 4.1 Financing Investment

DMAE's performance is supported by its financial self-sufficiency. The company does not receive any governmental or municipal subsidies, nor does it cross-subsidise other public services. DMAE entirely relies on its revenues, that is to say on consumers' bills, to directly self-finance investments or repay contracted loans. See Table 3 Self-financing ratio:

Table 3 **Ratio self-financed/others**

	WORKS INVESTMENTS				INVESTMENTS (US\$) EQUIPMENTS + ASSETS
	SELF-FINANCED		OTHERS		
	(US\$)	(%)	(US\$)	(%)	
1990	5,964,443	100			1,192,645
1991	5,748,894	100			780,696
1992	2,997,783	100			238,008
1993	3,370,151	100			353,025
1994	12,723,410	100			2,364,321
1995	21,119,238	100			3,448,263
1996	27,029,902	99.93	19,170	0.07	3,216,096
1997	18,936,033	70.44	7,947,530	29.56	2,165,590
1998	20,550,119	52.99	18,230,816	47.01	1,865,348
1999	10,686,081	55.58	8,541,757	44.42	1,744,503
2000	9,176,165	62.01	5,622,566	37.99	1,454,278
2001	8,781,709	81.02	2,057,136	18.98	608,454
TOTAL	147,083,927.41	-	42,418,975.51	-	19,431,227.45

Source: COP

Financial self-sufficiency strengthens DMAE's creditworthiness as it guarantees loan repayment and, on turn, ensures future access to capital finance necessary to implement investments.

DMAE's practice in relation to financing capital investment is to shop around for the less costly and more suited financial source. In this sense, DMAE has a long established track record of resorting to multilateral finance, which generally offers lower interest rates and longer repayment periods than any national public bank. When it was set up, DMAE benefited from a US\$ 3.15m loan issued in 1963 by the IADB for the overhaul of water supply and the expansion of the pipeline network (DMAE, 2001, pp. 12, 21). The loan, which had to be matched by a corresponding amount from the municipality (on a 50/50 basis), was also used to cross-subsidise other municipal services in need for cash (Ilha *et al.*, 2001). More recently, the IADB has financed part of the environmental management program Pró-Guaíba, aiming at cleaning up Lake Guaíba. The first part of the program allowed to finance the construction of the US\$ 5.56m Ipanema wastewater treatment plant (entirely self-financed) and building of Km 130 of sewerage network, and Wastewater Pumping Plant (financed by IADB, US\$ 16m), as well as to provide 4,382 households with connections to the primary sewerage network. Actually 3092 households have already been concluded. The cost was US\$ 412,066, self-financed. (August 2002)

The IADB also has financed the construction of the US\$ 11.53m São João-Navegantes Wastewater Treatment Plant.

DMAE is now exploring the scope for tapping a blend of multilateral and federal source in order to finance construction of the R\$ 270.3m Serraria wastewater treatment plant. The aim of the proposed co-financing scheme is to enjoy the favourable terms and conditions offered by multilateral lenders while cushioning the loan from currency risk. In fact, a loan entirely issued in US\$ would expose DMAE to the volatility of the Brazilian R\$ and the risk of spiralling repayment costs. Also, DMAE will seek to obtain a direct loan without any intermediaries to avoid the pitfalls of the Pró-Guaíba loan, which IADB had issued to Rio Grande do Sul State and then on-lent to DMAE. This should allow DMAE to obtain better conditions as well as to reduce bureaucratisation and expedite disbursement and use of investment finance

Table 4 Main works in the last years

Works	Source	Works conclusion	Costs - US\$
Sewerage Network Sub-Basin AA4	Financed- BANRISUL	31/jul/02	870,316.50
Replacement of Water network- Ipanema	Financed- BANRISUL	03/jul/98	1,261,387.17
Replacement of Water network Jardim Brasília	Financed- BANRISUL	28-Dec-97	1,831,045.49
Wastewater Treatment and Wastewater Pumping Plants Belém Novo	Financed- CEF	31/jul/02	1,675,418.43
Wastewater Treatment Plant São João Navegantes	Financed- IADB	11/jun/02	11,526,075.89
Sewerage network Sub-Basin I 1 -Ipanema	Financed- IADB	05/abr/00	4,819,899.24
Sewerage network Sub- Basin I 4 - Ipanema	Financed- IADB	17/abr/99	2,000,252.01
Sewerage network Sub- Basin I 3 - Ipanema	Financed- IADB	15-Aug-99	1,793,571.99
Wastewater Pumping Plant 1S,2S and 3S- Ipanema	Financed- IADB	29/nov/99	1,667,582.77
Sewerage network Sub-Basin I 5- Ipanema	Financed- IADB	18/mar/99	1,556,288.33
São João Water Pumping Plant-New Building	Self-Financed	13-Dec-99	10,329,035.04
Wastewater Treatment Plant Ipanema	Self-Financed	03/mar/98	5,564,760.92
Water network in HDPE	Self-Financed	30/nov/96	5,715,814.62
Consultant Service	Self-Financed	17-Oct-97	2,705,961.84
Water network in HDPE	Self-Financed	02/mar/02	1,194,930.20
Water Treatment Plant Menino Deus Recovery and enlargement of the Administrative Building	Self-Financed	28-Sep-01	779,042.70

Source: COP

## 4.2 Pricing policies

Pricing in Porto Alegre, including pricing of water supply, sanitation and complementary services, is designed to cover all operating costs, investments and capital costs. In order to anticipate resources to develop water and sewage works, DMAE get long term loans which are repaid integrally with tariff resources.

Pricing formulae are designed to allow for expansion and upgrade of the system while taking into account social considerations, through subsidised social tariffs for low-income consumers and moderation.

As of January 2002, the price of water per cubic meter was the equivalent of US\$ 0.3749 (R\$0.9033), which was among the lowest, water prices in Brazil. The 'no dividend' policy, which allows the minimisation of prices for a given amount of investment, certainly contributes to the relatively low tariff charged by DMAE.

However, it should be noted that the pricing formula does not cover investment depreciation. Nor is depreciation accounted for in DMAE's business plan: DMAE's accounts are prepared under public accounting conventions (law 4320) and so do not provide for depreciation.

The pricing formula for water supply has a progressive structure in that step block tariffs are applied for increasing volumes of water consumed. Monthly charges are calculated according to the following formulae.

- 1 -Consumption up to 20 m<sup>3</sup>  
 $(PB \times C/E) \times E$
- 2 - Consumption between 21 m<sup>3</sup> and 1.000 m<sup>3</sup>  
 $\{PB \times 0,2711 \times [(C/E)^{1,43577}]\} \times E$
- 3 - Consumption over 1.000 m<sup>3</sup>  
 $(PB \times C/E \times 5,5) \times E$

Where:

- PB - Basic Price (water m<sup>3</sup> price)  
 C - Consumption (volumes consumed)  
 E - Households

Conversely, the pricing formula for sewerage provides for a flat rate irrespective of consumption, as described below.

- 4 - The sewage collection is charged as:  
 $(PB \times C/E \times 0,8) \times E$

In all the above formulae, the value of the basic price PB varies according to the different categories of users: households, commercial and industrial consumers, public administration. Tariffs applied to the public administration are considerably higher than those charged to the other users, due to their poor payment record. Water is provided free only for municipal entities, under law number 170/87 article 53.

Pricing formulae applying to low-income households are further subject to subsidisation. More precisely, the social charge applies to single-family households of up to 40 m<sup>2</sup>, community households built by the state and municipal housing programs (respectively COHAB and DEMHAB) and some welfare institutions and charitable organisations, among others. Such users pay the price correspondent to 4m<sup>3</sup> for the first 10 m<sup>3</sup> consumed. If consumption exceeds the threshold of 10 m<sup>3</sup>, the formula used is linear and not progressive, so that the basic price is applied to all cubic meters exceeding the first 10.

A total of 65.650 households are affected by the social tariffs.

In 2001, 10% of total bills were uncollected: most of these were issued either to domestic consumers or public administration. In case of failure to pay, DMAE make every effort to warn the customers and try to negotiate with easy conditions before proceeding with the cut-offs, in order to prevent social or health problems.

There is no fund set up to mitigate non-payment of bills

In order to reduce non-payment, since August 2000 monthly bills issued to consumers contain clear information on outstanding debts.

In order to increase investments, DMAE has decided to increase water supply and sanitation tariffs by 17.97% starting from 1st March 2002, while charges for complementary services would increase by 15% in average. As a result, basic prices applied to households would increase from US\$ 0.3749 to US\$ 0.4586 per cubic meter. The increase to water average tariff was US\$ 1,3611 equal to 2.88 one way bus ticket in Porto Alegre. Tariff increases for the different categories of users are summarised below:

Table 5 **Basic prices increase**

BASIC PRICES (US\$) (PB)	Value in January / 02	Value in March / 02	Increase
		<b>17.97%</b>	
Household 1m <sup>3</sup> (1000 liters)	0.3749	0.4586	0.0837
Commercial / Industry	0.4242	0.5189	0.0947
Public Administration	0.7498	0.9172	0.1674
Social Water Tariff	1.4996	1.8344	0.3348
Social Sewage Tariff	1.1997	1.4675	0.2678
Social Tariff ( water+sewage)	2.6993	3.3019	0.6026
Water Average Tariff ( 16 m <sup>3</sup> )	5.9764	7.3376	1.3611

Source: COP

DMAE estimates that the increases would not have a great impact on consumers in nominal value, but would allow the company to increase profit reinvestment up to nearly 25% of its revenues (*"in order to return to the desired level of 25% of investment/revenue"*). Following a review of its tariff structure, DMAE found out that it was necessary to readjust tariffs in order to increase reinvestment in the system. Since 1997, revenues had in fact fallen due to decreased consumption while growing urbanisation had meant an increase in fixed costs in terms of system expansion and maintenance, irrespective of variations in demand. Furthermore, DMAE's finances had been under pressure due to the increases in the cost of energy – respectively, of 19% in 2000 and 21% in October 2001, as opposed to the 9.08% increase in inflation in the same period, whereby electricity costs account for 8% of DMAE's total revenues. Finally, the move followed the necessity to update charges for complementary services with inflation.

Following the technical analysis (supported by a consultancy contracted for the purpose), the proposal for tariff readjustment was submitted to the Deliberative Council for approval, as this is the competent body on pricing. It should be noted that, during the discussions with the Deliberative Council, DMAE's technical team held several meetings with the civil society organisations represented within the Council itself. The proposal was also presented to and received the approval of the Participatory Budget.

### **4.3 Financial record**

Table 6 below shows DMAE's some financial record for the period 1995-2001. All expenses are broken down in nominal value and as a percentage of total revenues. It is possible to observe how investments as a percentage of revenues have decreased throughout the years from 28.86% in 1995 to 26.28% in 1996, down to 10.84% in 2001.

EXPENSES FROM REVENUE	1995	% ON REVENUE	1996	% ON REVENUE	1997	% ON REVENUE	1998	% ON REVENUE
INVESTMENTS	27.659.507,17	28,86%	28.461.975,92	26,28%	26.261.565,54	21,75%	26.139.573,52	19,94%
Investments in works	20.517.339,26	21,41%	24.121.738,36	22,27%	23.845.632,89	19,75%	23.886.419,93	18,22%
Equipment and assets	3.349.987,51	3,50%	3.340.237,56	3,08%	2.415.932,65	2,00%	2.253.153,59	1,72%
Other investments	3.792.180,40	3,96%	1.000.000,00	0,92%	-	0,00%	-	0,00%
TOTAL EXPENSES (REVENUE)	103.753.970,36	108,27%	112.099.874,17	103,50%	121.943.834,05	100,99%	128.799.779,59	98,23%
EXTERNAL INCOME - Works investments			3.971.427,75		6.145.670,41		22.957.072,23	
TOTAL GENERAL	103.753.970,36	108,27%	116.071.301,92	107,17%	128.089.504,46	98,82%	151.756.851,82	99,10%

EXPENSES FROM REVENUE	1999	% ON REVENUE	2000	% ON REVENUE	2001	% ON REVENUE
INVESTMENTS	22.935.069,31	17,43%	20.997.367,78	14,05%	17.007.826,97	10,84%
Investments in works	19.815.549,20	15,06%	18.154.836,95	12,15%	15.596.456,65	9,94%
Equipment and durable goods	3.119.520,11	2,37%	2.842.530,83	1,90%	1.411.370,32	0,90%
Other investments	-	0,00%	-	0,00%	-	0,00%
TOTAL EXPENSES (REVENUE)	130.497.323,00	99,16%	141.819.073,19	94,95%	154.761.911,82	98,65%
EXTERNAL INCOME - Works investments	14.567.669,83		10.770.762,81	7,06%	4.773.595,17	
TOTAL GENERAL	145.064.992,83	98,76%	152.589.836,00	95,16%	159.535.506,99	98,69%

Table 6

Note: All values are in Reals (R\$), Brazilian currency, and in nominal terms

It is possible to implement the tables with the following data relating to investments in to water supply and sanitation respectively in nominal value and as a percentage of sectorial revenues for the year 2001.

<b>Investment in water supply as related to water tariff collected</b>			
YEAR	Revenue (R\$)	Investment (R\$)	%
2001	99.083.396,28	10.893.101,66	10,99

Source: COP

Note: Refers to collected revenue on water services tariff

<b>Investment in sanitation as related to sanitation tariff collected</b>			
YEAR	Revenue (R\$)	Investment (R\$)	%
2001	31.927.306,60	4.703.354,99	14,73

Source: COP

Note: Refers to collected revenue on sewage services tariff

Following the approval of tariff readjustment from March 2001, DMAE's management started considering what investments would be realised with forthcoming revenues and have budgeted near to 25% investment/revenues for the year 2003.

#### **4.4 Finance and solidarity**

The financial base of DMAE is completely self-contained, dependent on the revenue raised from charges to users. In effect, the whole city is a tax base to finance public objectives: "everything can be done through solidarity". In DMAE's case, at least in 2002, the strong public accountability has demonstrably enabled them to get approval of a price increase necessary for the investment programme – again, the democratic accountability is a positive asset for the financial sustainability of the company.

### **5 Capacity Building & Technical Assistance**

DMAE is active in supporting smaller municipal water companies in the state of Rio Grande do Sul through capacity building and technical assistance. The underlying principle to DMAE's external activities, in conjunction with other companies sharing its public service ethos, is that all costs are passed on to the beneficiary undertaking but at no profit to DMAE.

In 2001, DMAE has signed a mutual agreement with Bagé's DAEB, while in 2002 it was the turn of SANEP in Pelotas and Caxias do Sul's SAMAE. As a result of such agreements, DMAE has lent its own equipment (e.g. trucks and bottling machines) for the smaller companies to test and familiarise with.

Federal or multilateral financial support to these kind of twinning arrangements and Public-Public Partnership (PUPs) would induce a positive impact on sustainable water development, at a lesser cost than most PPPs.

## 6 Conclusions

As we have already seen, DMAE gathers features that perfectly let us realize that it is inserted in a virtuous cycle, which impels the department forward as a successful water and sanitary sewage services undertaker.

Since it establishes a tariff that places the department in a balanced economic-financial situation allowing developing technically and managerially its staff, it also provides a surplus that, through the public participation, promotes water and sanitary sewage systems improvements, which increases the city's public welfare and environmental protection.

Once the population is under both environment and water/sewerage good conditions, advancing social inclusion, while they are returning it to the city council as a tariff affordable to each social class, this generates a customer satisfaction and gives opportunity to the city to speed up its own development, allowing industries, commerce and new residential areas to grow.

And to close the cycle, all this development is the way to maintain the levels of the tariff revenue, which has started the cycle.

It draws considerable strength from the validation of its policies through the highly transparent and participative system of governance. This has tangible benefits in a number of areas, including demand management and price-setting

DMAE appears as a sustainable and responsible municipally-owned water undertaking and its model might be replicated elsewhere in Brazil and possibly exported to other developing countries.

Many water operations, in all countries, could learn from this process.

## 7 Annexes and tables:

DMAE  
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### DMAE in numbers

**Table 6. Staff Ratios at DMAE**

Total number of employees (Oct 2001)	2,453
Budget for 2001	R\$ 169,534,674
Number of households with water and domestic sewage (Oct 01)	833,837
Number of connections with water and domestic sewage (Oct 01)	349,759
Budget to staff ratio	R\$ 69,000 per staff in activity Or US\$25,000 per staff in activity
Ratio of city inhabitants to staff (Oct 2001)	439 inhabitants per staff in activity
Ratio of connections to staff	340 connections per staff in activity

**Table 7: Water Figures in Porto Alegre**

Pumping stations for untreated water (EBABs)	8
Water treatment stations (ETAs)	8
Treated water pumping stations (EBATs)	92
Number of reservoirs	97
Capacity of reservoirs	184,230 cu. meters
Number of truck that deliver water	12
Number of linked branches (1 linked branch provides connections to several households)	249,340
Number of households connected	539,772
Percent of population connected to water system	99.5%

**Table 8: Sewage Figures in Porto Alegre**

Sewer pumping stations (EBEs)	12
Houses (structures) linked to sewer sewage	100,419
Households linked to mixed sewage (wastewater & sewer)	74,918
Households connected to sewers	294,065
Households connected to mixed sewage	158,362
Percent of households linked to sewage (55% sewer, 29% mixed)	84%
Percent of households whose sewage is treated	27%

**Table 9: Comparison of Prices of Water and Sewage in Brazilian Cities**

Figures are in Brazilian Reais (US\$1 = R\$ 2.80) are based on monthly consumption

	Service/Company	CITY/STATE	20m <sup>3</sup> WATER+SEWAGE	20m <sup>3</sup> WATER	20m <sup>3</sup> SAWAGE
1	CORSAN	Rio Grande do Sul	65.45	41.79	23.66
2	CASAL	Maceió/AL	56.92	31.62	25.30
3	CASAN	Florianópolis/SC	56.16	31.20	24.96
4	SANEPAR	Curitiba/PR	55.35	30.75	24.60
5	COMPESA	Recife/PE	50.86	25.43	25.43
6	DESO	Aracaju/SE	47.97	26.65	21.32
7	CESAN	Vitória/ES	45.25	25.15	20.10
8	CAESB	Brasília/DF	40.30	20.15	20.15
9	DMAE	Porto Alegre/RS	38.36	21.31	17.05
10	SABESP	São Paulo/SP	38.16	19.08	19.08
11	CAERN	Natal/RN	37.90	18.95	18.95
12	COPASA	Belo Horizonte/MG	37.61	18.80	18.80
13	SANEAGO	Goiânia/GO	37.15	20.65	16.50
14	SANASA	Campinas/SP	31.90	15.95	15.95
15	CAGECE	Fortaleza/CE	27.86	13.93	13.93

Source:PSI

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<sup>1</sup> Source: <http://tabnet.datasus.gov.br/cgi/idb2001/b05.htm>

<sup>2</sup> Lobina and Hall « UK water privatisation – a briefing » section 4.2  
[www.psir.org/reports/2001-02-W-UK-over.doc](http://www.psir.org/reports/2001-02-W-UK-over.doc)