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Enhancing Brazil's
Regulatory Framework
for Network Industries: The
Case of Electricity, Oil and
Gas, and Water and
Sanitation

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**ENHANCING BRAZIL'S REGULATORY FRAMEWORK FOR NETWORK INDUSTRIES: THE
CASE OF ELECTRICITY, OIL AND GAS, AND WATER AND SANITATION**

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by Edmar Almeida and Nanno Mulder

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Abstract/résumé

This paper assesses Brazil's regulatory framework and agencies for several network industries (electricity, oil and gas, and water and sanitation). Private investment can be encouraged by tackling regulatory uncertainty in many areas. To this end, recent initiatives include a new regulatory model for the electricity sector, and new draft legislation on the role and structure of the regulatory agencies (currently in Congress). The overall approach to regulatory reform in network industries, particularly in electricity, is well thought out but the risk of regulatory failure should not be underestimated. Implementation will be the ultimate test of reform in this area. In natural gas, the dominance of Petrobras, the national oil company, throughout the industry has often been perceived as an obstacle to its development. Private investment in water and sanitation is constrained by a lack of clarity over the assignment of regulatory powers across different levels of government. These reforms are consistent with the government's agenda for growth, focusing on meeting the challenge of improving the business environment. This Working Paper relates to the 2005 *OECD Economic Survey of Brazil* (www.oecd.org/eco/surveys/brazil).

JEL classification: K23, L51, L94, L95, O54, Q48.

Key words: Brazil, regulation, regulatory agencies, economics of regulation; electricity; oil, gas; pipelines; water utilities, sanitation, Government Policy (Energy).

* * *

Ce papier évalue le cadre réglementaire ainsi que les agences régulatrices pour plusieurs industries de réseau (électricité, pétrole et gaz, eau et assainissement). L'investissement privé pourrait être encouragé en réduisant l'incertitude réglementaire dans plusieurs domaines. A ce propos, des initiatives récentes incluent un nouveau modèle réglementaire pour le secteur de l'électricité et un projet de loi sur le rôle et la structure des agences régulatrices (actuellement au Congrès). L'approche générale retenue en ce qui concerne la réforme de la réglementation dans les industries de réseau, notamment dans le secteur de l'électricité, est judicieuse, mais le risque de défaillance de la réglementation ne doit pas être sous-estimé. C'est au stade de sa mise en œuvre que la réforme dans ce domaine sera mise à l'épreuve. Pour ce qui est du gaz naturel, la position dominante de la société pétrolière nationale Petrobras dans l'ensemble du secteur a souvent été perçue comme un obstacle au développement de celui-ci. L'investissement privé dans les secteurs de l'eau et de l'assainissement se heurte à un manque de clarté dans la répartition des pouvoirs de réglementation entre les différents niveaux d'administration. Ces réformes se situent dans la lignée du programme de croissance du gouvernement, en mettant l'accent sur l'amélioration de l'environnement des entreprises. Ce Document de travail se rapporte à l'Étude économique de l'OCDE du Brésil, 2005 (www.oecd.org/eco/etudes/bresil).

Classification JEL: K23, L51, L94, L95, O54, Q48.

Mots clefs: Brésil, réglementation, agences régulatrices, électricité; gaz; pétrole; eau, assainissement, politique publique (énergie).

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TABLE OF CONTENTS

ENHANCING BRAZIL'S REGULATORY FRAMEWORK FOR NETWORK INDUSTRIES: THE CASE OF ELECTRICITY, OIL AND GAS, AND WATER AND SANITATION.....		4
1.	Introduction	4
2.	Unifying the institutional framework for the regulatory agencies.....	5
3.	Regulation of network industries.....	9
3.1.	Electricity.....	9
3.2.	Natural gas	14
3.3.	Oil	17
3.4.	Water and sanitation	18
ANNEX 1. SELECTED REGULATORY AGENCIES: ANSWERS TO A QUESTIONNAIRE SUBMITTED TO THE BRAZILIAN AUTHORITIES.....		26

Boxes

Box 1.	Regulatory agencies in 5 OECD countries: The case of energy ¹	7
Box 2.	The 2001 energy crisis and its aftermath.....	11
Box 3.	The new model for the electricity sector	13
Box 4.	Current regulation of the natural gas industry	15
Box 5.	Water pollution and its impact on the environment and health	20
Box 6.	Regulation in the water and sanitation sector: France, United Kingdom, and United States ¹	23

ENHANCING BRAZIL'S REGULATORY FRAMEWORK FOR NETWORK INDUSTRIES: THE CASE OF ELECTRICITY, OIL AND GAS, AND WATER AND SANITATION

By Edmar Almeida and Nanno Mulder¹

1. Introduction

1. On-going fiscal consolidation has taken a toll on the government's ability to invest, particularly in infrastructure. At the same time, the private sector has not been able to sustain the levels of investment observed in the past. In addition to macroeconomic volatility, private investment in infrastructure has been affected adversely by the regulatory environment, which needs to be strengthened in several sectors.

2. Recent initiatives in this direction include the new regulatory model for the electricity sector and draft legislation, submitted to Congress in 2004, on the role and structure of the regulatory agencies. In the electricity sector, the overall approach to regulatory reform, based on arms-length operations and public auctions, is well thought out but the risk of regulatory failure should not be underestimated, given the enhanced role of government in long-term planning. But, again, implementation will be the ultimate test of reform in this area.

3. In natural gas, as well as water and sanitation, much-needed new regulatory frameworks are under discussion. In natural gas, the dominance of Petrobras, the national oil company, throughout the industry has often been perceived as an obstacle to its development. Private investment in water and sanitation, which is much needed in light of relatively low connection rates to sewerage, is constrained by a lack of clarity over the assignment of regulatory powers across different levels of government. The share of wastewater that is treated is also low, with a detrimental impact on the environment. Finally, in the oil sector, specific provisions of current legislation, in particular third-party access to pipelines and refineries, need to be enforced more vigorously.

4. Against this background, this paper discusses options for improving the regulatory framework for several network industries (electricity, oil and gas, and water and sanitation), including the functioning of the regulatory agencies. The main challenges in these areas are to reduce regulatory uncertainty by clearly defining the role of government in planning and service delivery and strengthening the regulatory agencies.

5. The paper is organised as follows. The next section assesses the functioning of the regulatory agencies monitoring electricity, oil and gas, and water. Section 3 analyses the functioning and regulation of

1. This paper was originally prepared for the *OECD Economic Survey of Brazil* published in March 2005 under the responsibility of the Secretary General of the OECD. Edmar Almeida is a professor at the Federal University of Rio de Janeiro and Nanno Mulder is an economist at the Economics Department of the OECD. The authors are indebted to Val Koromzay, Andrew Dean, Silvana Malle, Luiz de Mello, Stéphane Jabobzone, and Sylvie d'Apote for useful comments; to several Brazilian officials and experts with whom they discussed regulatory reform; to Anne Legendre, for technical assistance; and to Muriel Duluc and Lillie Kee, for secretarial assistance. The paper also draws from a background report on regulatory reform in Brazil prepared by José Claudio Linhares Pires. Responsibility for any errors rests with the authors.

four network industries: electricity, natural gas, oil, and water and sanitation. It also suggests regulatory improvements.

2. Unifying the institutional framework for the regulatory agencies

6. There are significant differences in the role and structure of the regulatory agencies for network industries (*e.g.*, electricity, oil and gas, telecoms). This is due in part to the fact that they were created in different points in time and are based on different sectoral legal frameworks (Table 1 and Annex A1). They nevertheless have in common the fact that they were created as an integral part of the government's strategy to partially transfer infrastructure services to the private sector through privatisation and deregulation.² Comparison of three agencies — ANA (surface water resources), ANEEL (electricity) and ANP (oil and gas) — highlights the following main features of the current institutional set-up.³ *First*, the agencies' objectives range from the protection of consumer rights and the promotion of competition to the development of network industries. *Second*, accountability and financial control mechanisms vary, although all agencies are answerable to their respective line ministries and the Federal Court of Accounts (TCU). Of the three agencies reviewed, only ANA and ANP do not have an Ombudsman and only one agency (ANEEL) has a management contract with its line ministry. *Third*, the terms in office of the agencies' chief executives differ in length, as well as the legal provisions for reappointment. *Finally*, the institutional structure of these regulatory agencies is, by and large, comparable to those of OECD countries (see Box 1).

-
2. The current sectoral frameworks also have some commonalities. All sectoral laws specify that: the regulatory agencies are independent and administratively "linked" to their line ministry (*autarquia sob regime especial, com personalidade jurídica de direito público e autonomia patrimonial, administrativa e financeira, vinculada ao Ministério*); the chief executives and Board members are appointed by the President and ratified by the Senate, and, conflict resolution, including mechanisms for appeal, is through the legal system.
 3. Eight regulatory agencies were created between 1996 and 2001: ANEEL (electricity), ANP (oil and gas), ANATEL (telecommunications), ANTT (land transport), ANTAQ (water transport), ANS (private health insurance), ANVISA (health and sanitary surveillance), and ANA (surface water resources). See Pires and Piccinini (1999) and Pires (2004), for more information.

Table 1. Main characteristics of selected regulatory agencies

	ANA	ANEEL	ANP
Established in	2000	1997	1997
Purview	Surface water resources	Electricity	Oil and gas
Institutional status	Independent but administratively "linked" to the line ministry (<i>autarquia especial</i>)	Independent but administratively "linked" to the line ministry (<i>autarquia especial</i>)	Independent but administratively "linked" to the line ministry (<i>autarquia especial</i>)
Appointment of chief executive	Fixed non-concomitant term, 3-5 years; strict provisions for dismissal, non-renewable	Fixed non-concomitant term, 4 years; strict provisions for dismissal, non-renewable	Fixed non-concomitant term, 4 years; no provisions for dismissal, non-renewable
Accountability	Federal Court of Accounts	Federal Court of Accounts	Federal Court of Accounts
Transparency	Public hearings, decisions on internet	Public hearings, decisions on internet	Public hearings, decisions on internet
Ombudsman	No	Yes	No
Management contract	No	Yes	No
Cooperation with competition authorities ¹	No	Yes, cooperation agreements with all three authorities	Yes, working groups with all three authorities

1. There are three competition authorities at the federal government level: the Secretariat for Economic Law (SDE), the Secretariat for Economic Monitoring (SEAE), and the Administrative Council for Economic Defence (CADE).

Source: OECD, based on Annex A1.

Box 1. Regulatory agencies in 5 OECD countries: The case of energy¹

The experience of 5 OECD countries (Mexico, Portugal, Spain, United Kingdom, and United States) illustrates different institutional settings for regulatory agencies in the energy sector. Most agencies have purview of both electricity and gas, except for Portugal, where it is limited to electricity. Their mandates depend on the extent of deregulation and market access, which may be limited in some countries (e.g., the petroleum and electricity sectors in Mexico). In the European countries, following the implementation of European directives, regulatory agencies in the electricity sector are also responsible for natural gas. All agencies are legally independent, and are often financed by a mix of fees and budgetary allocations. Mexico is the only example among these five countries where financing comes solely from budgetary sources. Personnel regulations typically follow those of the civil service, where available, with possible exemptions to allow for some flexibility in pay schemes in order to attract qualified professionals. Boards of directors typically have between 3 to 9 members, with the agencies' chief executive being appointed by the Head of State (Mexico), by the Head of State with approval by the legislature (United States), by a minister (Spain, UK), or by the Council of Ministers (Portugal). Chief executives are appointed for a period of 5-6 years (renewable) and cannot be fired for reasons related to policy. Board members are appointed for a 5-year term (also renewable), except for the United Kingdom, where appointments are open-ended. In all countries, the agencies cooperate with the ministries of finance/economy and energy and the competition authorities, with informal cooperation taking place through liaison meetings and exchange of documentation.

With regard to accountability, the agencies usually submit annual reports, covering activities and financial statements, to government and the legislature. The agencies also have disclosure obligations, in terms of publishing reports, market studies, regulatory guidelines, and policy papers. In all countries, the agencies are audited externally on a regular basis. Rulings can be challenged through the legal system, while in Spain the government can also overturn agency rulings.

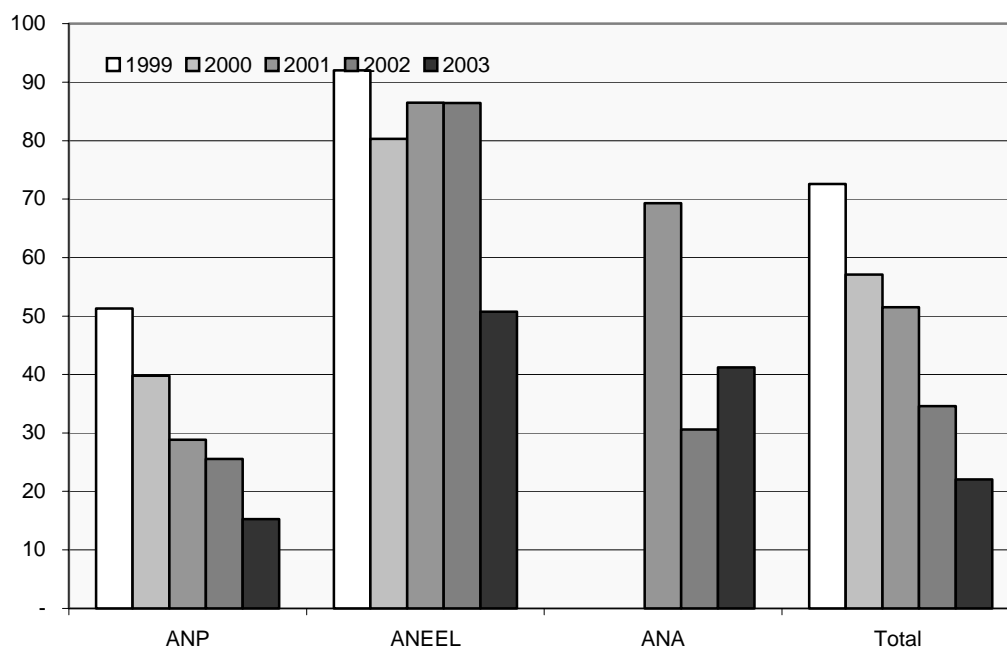
1. See for more information, OECD (2004a).

7. Comparison of these three agencies highlights the following main issues:

- Reliance on federal funding varies across agencies. Due to on-going fiscal consolidation, and the earmarking of revenue — which is not included in the agencies' budget allocations and can be sizeable in some cases — actual disbursement as a share of budget allocations has been reduced (Figure 1). This reduction of budget allocation is deemed by some agencies to be detrimental to their ability to fulfil their mandate, as well as in some cases restricting research activities and therefore investment opportunities for the private sector.

Figure 1. Budget allocations for selected regulatory agencies, 1999-2003

Actual disbursements (excluding personnel) in per cent of approved budgets



Source: Ministry of Planning and Budget.

- Skill shortages are not uncommon. The agencies do not have their own staff and are not allowed to hire outside civil service channels. Most staff have temporary contracts without an adequate system of incentives and remuneration.
- Coordination between the agencies and the competition authorities (CADE, SDE and SEAE) is uneven. Competition advocacy and conduct investigations are under the responsibility of the competition authorities. However, in practice, ANEEL and ANP cooperate with the competition authorities, whereas ANA does not.⁴
- Rulings can be overturned by first-instance judges, creating judicial uncertainty and delaying business decisions.⁵

8. To resolve a number of the issues outlined above, draft legislation on the regulatory agencies is in discussion in Congress, containing the following elements. *First*, accountability mechanisms are to be standardised. Agencies and line ministries will sign management contracts with a minimum duration of one year setting out activities and performance targets, with funding associated with each activity. In the event of non-compliance, the agency's budget may be cut. The agencies will need to report to their respective line ministries, Congress, and the Federal Court of Accounts every semester and issue an annual activity report. An independent Ombudsman will be created in each agency. *Second*, the chief executives

4. ANEEL and ANP cooperate with the competition authorities in the investigation of mergers, privatisation procedures, and anti-competitive conduct. See OECD (2004b), for more information.

5. See Araújo and Pires (2000), for further discussion.

of all agencies will be appointed for four years (renewable). *Third*, a related draft law provides for a more stable personnel policy, including a competitive entry exam for new employees and specific career/remuneration provisions. *Fourth*, the draft law defines the role of the competition authorities in regulatory matters in the network industries.⁶ *Finally*, the draft law also foresees the transfer of responsibility over the organisation of auctions and terms of concessions to the line ministries, although this function can be delegated back to the regulators, as in the case of electricity.

9. Despite improvements, the reforms do not deal with a number of shortcomings in the current institutional set-up. In particular, new legislation does not deal with financing options for the agencies. Other issues outlined above would probably require changes in sectoral laws, such as their overall objectives and competencies, and coordination among the agencies. In line with the experience of some OECD countries, regulators have often put into question the usefulness of management contracts, as sectoral laws already clearly spell out the tasks of the agencies and include accountability and appeal mechanisms. Another concern is the transfer of responsibility over setting up and organising concession auctions to the line ministries. This may facilitate political interference in otherwise essentially technical matters, and line ministries may lack the technical expertise to carry out this function.

3. Regulation of network industries

3.1. Electricity

Background and main issues

10. Brazil has a modern electricity industry. The industry depends heavily on hydropower, accounting for nearly 80 per cent of generation capacity (Figure 2) and 90 per cent of electricity generated in 2003. Brazil has the largest capacity for water storage in the world, and one of largest transmission networks, given the long distances between power stations and consumers and the need for back-up circuits to ensure alternative supply routes and optimal regional balance in supply. Both private and government-owned companies operate in generation, transmission, and distribution.⁷ Eletrobrás, controlled by the federal government, and three other state-owned companies account for one-half of generation capacity. On the other hand, more than two-thirds of the distributors are privately owned/controlled.⁸ The transmission grid is run by a collegiate of players: producers, transmission and distribution companies, and the government through the Ministry of Mines and Energy.

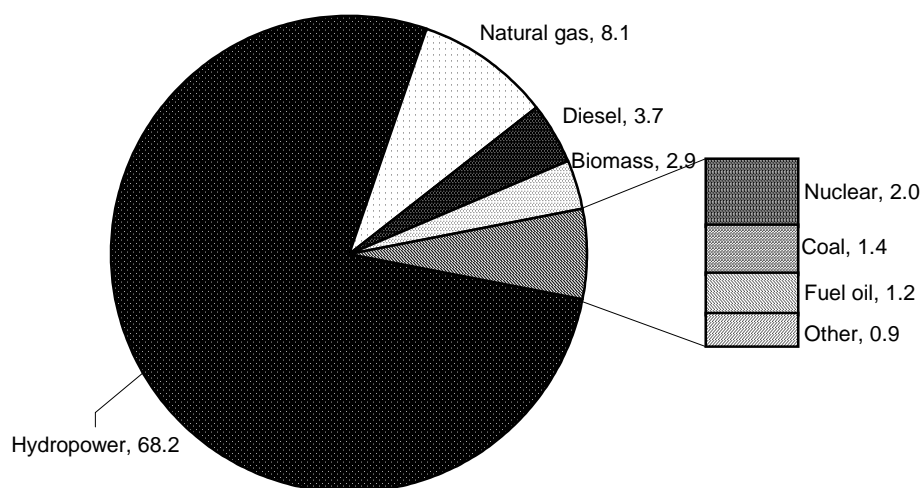
6. Regulatory agencies will be required to submit to SEAE each administrative act that affects competition before it is submitted for public consultation. In turn, SEAE will prepare a non-binding analysis of its impact.

7. In 2004, 59 companies operated in generation and 64 in distribution.

8. The electricity industry underwent important institutional changes in the 1990s, including the adoption of Law 9 074 in 1995 allowing for independent power producers (IPPs) and large consumers (more than 10 MW) to buy electricity from the supplier of their choice, including IPPs. In 1996, Law 9 427 created ANEEL (*Agência Nacional de Energia Elétrica*), the regulator for the electricity sector. In 1998, the government created an independent system operator (*Operador Nacional do Sistema Elétrico*, ONS) responsible for the technical coordination of electricity dispatching and for the management of transmission services, and a wholesale market (*Mercado Atacadista de Energia*, MAE) in charge of netting the differences between agreed quantities in bilateral contracts and actual production. By November 2000, 24 state companies had been privatised. For more information, see OECD (2001, 2002b).

Figure 2. Generation capacity by source

in GigaWatts (July 2004)



Source: ANEEL.

11. Electricity demand is expected to continue to grow at a brisk pace. Currently, 97 per cent of households are connected to the electricity network. The income elasticity of demand for electricity is estimated by Eletrobrás at above unity. To illustrate, between 1980 and 2000, electricity demand increased on average by 5.4 per cent per year while GDP grew by 2.4 per cent on average per year. Investment is therefore needed to boost generation and transmission capacity because there is limited excess supply, despite the reduction in demand following the rationing programme implemented in 2001 in response to an energy shortage (Box 2).⁹

9. The 2004-07 multi-year budget (PPA) foresees an expansion in capacity of 3.5 GW per year, compared to an average of 1.5 GW per year in the 1990s. The IEA estimates that electricity demand will increase 2.5 times between 2000 and 2030, or at an average annual rate of 3.2 per cent. This growth rate is estimated by the IEA to require USD 330 billion in new investment (USD 156 billion for new generation capacity and USD 175 billion for the expansion of the distribution and transmissions systems). Almeida (2004) estimates the annual growth rate of electricity demand to be higher (5 per cent), but the investment cost to be lower (USD 8 billion per year), although his estimate is above that of the government.

Box 2. The 2001 energy crisis and its aftermath

Mismatches in the expansion of electricity supply and demand worsened throughout the 1990s. Despite market-oriented reforms aiming to boost private investment, implemented after 1996, installed capacity expanded by only 28 per cent during 1990-99, whereas electricity demand increased by 45 per cent. The insufficient expansion of supply was partially mitigated by the depletion of water reserves. Recognizing the need to tackle the supply constraint, because the resumption of investment in hydropower generation was not likely to compensate for the delays that took place in the late 1980s and early 1990s, the government launched a programme (*Programa Prioritário de Termoeletricidade*, PPT) in 2000, aiming to encourage investment in gas-fired power plants and develop the market for natural gas. Due to regulatory uncertainty and the high cost of gas when transportation from Bolivia was factored in (see text), the PPT failed to provide strong enough incentives for new investment: of the 49 planned power plants, only 15 were built, adding about 4 GW in new generation capacity. Most of these new power plants came on stream too late to avoid a power shortage in 2001, when an unusually dry summer reduced reservoirs to a critical level. This, together with the rise in demand due to the economic recovery, resulted in a shortage of electricity during July-December 2001.

The government appointed a special commission to manage the energy crisis (*Câmara de Gestão da Crise de Energia Elétrica*, CGE). Through a price-based rationing programme, with high penalties for excess consumption and discounts for energy savings, coupled with an information campaign on television, electricity consumption was reduced by 20 per cent and blackouts were avoided. This contributed to reduce the impact of the energy crisis on economic growth, which nonetheless decelerated sharply in 2001 to 1.3 per cent. Moreover, an emergency programme for power generation was also put in place with additional incentives for investment in expanding short-term power supply projects. The government created a special company (*Companhia Brasileira de Comercialização de Energia Emergencial*, CBEE) for buying electricity on an emergency basis (*i.e.*, mainly from small-scale diesel-based generators and small power plants fired using residuals from sugar cane). About 2.1 GW of capacity was hired by CBEE, financed by a temporary tax levied on electricity consumption, and automatically sold to the distribution companies. CBEE is scheduled to be closed by 2005.

Rationing was lifted at end-February 2002. Energy saving contributed to the reduction of waste, as industry and households replaced power generators and appliances by more cost-efficient substitutes. By 2003, electricity consumption had still not reached the level prior to the rationing programme. This persistent reduction in demand, coupled with the increase in installed capacity after 2001, created excess supply in the market, adversely affecting generators and some specific distribution companies.

12. There has been insufficient investment in the electricity sector and the role of gas-fired power generation is still uncertain. In an industry heavily reliant on hydropower, there tends to be a significant gap in generation costs between the existing hydropower plants, and the gas-fired generators. The cost of the energy produced under PPT was typically above USD 40/MWh, against an expansion cost of hydropower estimated at around USD 30/MWh. Also, the supply of natural gas is deemed insufficient to meet demand by industrial users and electricity generators when gas-fired plants will be fully operational, undermining the role of existing plants as a reliable back-up to hydropower. The development of the gas sector, with the coming into stream of recently-found reserves off-shore and the integration of the Argentine network may, however, change this scenario. Meanwhile, Petrobras has underwritten most of the costs of PPT by purchasing several of the plants built in recent years, including some merchant plants. As in other countries, the idea of having merchant plants supplying energy during price spikes has proved problematic. This is due in particular to Brazil's relatively good transmission network and the absence of a very segmented market that could generate arbitrage opportunities. Given the integration of the system, there are very limited locational differences in spot market prices.

The new model and main challenges

13. A new model for the electricity sector was approved by Congress in March 2004 (see Box 3). Central to the new model is the creation of the "Pool" (*Ambiente de Contratação Regulado*, ACR),

matching electricity demand and supply capacity through long-term contracts, which will replace on a competitive basis the “initial contracts” inherited from the 1990s. These contracts were designed as a bridge between the regulatory environments prevailing in the 1980s and after the privatisation of most distribution companies in the 1990s. The “initial contracts” are scheduled to expire after 2002.¹⁰

14. The new framework is inspired by the “single-buyer” model, where an entity — typically the government — buys all electricity from producers and sells it to distributors. But the new model differs from the single-buyer model in two key aspects. *First*, there is not a single-buyer, as producers can sell to the Pool and to consumers outside the Pool. *Second*, future demand is not estimated by the single-buyer or government, but by the distribution companies.

15. The new model establishes a common mechanism for the purchase of energy for the Pool, but it allows market risk to be shared among participants instead of being borne exclusively by the government, which acts more like an auctioneer than a buyer. With long-term contracts set through the Pool, price uncertainty will be broadly restricted to electricity traded in the free, short-term market and bilateral contracts between generators and large consumers. Indeed, the Pool is aimed at captive consumers, such as households and small businesses, with large consumers allowed to buy electricity directly from generators on a competitive, customised basis. Large consumers are also free to invest in generation, selling the energy that exceeds their needs. Their role is thus central in ensuring the adequate balance between supply and demand. When they identify the risk of excess investment, they are likely to purchase from the Pool, while indications of shortages will stimulate the contracting of new investment. In the same vein, medium-term contracts involving large consumers will complement the information derived from short-term markets that tends to reflect mainly high-frequency changes in the level of water reservoirs rather than medium-term expectations about the pace of supply and demand.

16. Another important aspect of the model, in particular in a situation of temporary excess supply is the splitting of the market between the “old” generation plants (built before 2000) and the “new” ones. This ensures that short-term price considerations will not harm the adequate remuneration of future investments. The segmentation may, in addition, prevent the old generators from capturing the hydro rent. Electricity generated by various sources will therefore be pooled and sold to distributors at a price determined by the average of the different generation costs. The new model does not change the regulatory framework for transmission.

10. According to the “initial contracts”, generators continued to sell electricity on a historical cost-of-service basis. In 2001, ANEEL decided to annul one-quarter of the “initial contracts” per year between 2002 and 2005, and gradually transfer electricity exchange to the wholesale market for short-term electricity dispatching. The wholesale market was created in 1998, but handled only a small share of electricity transactions until the expiration of the “initial contracts”. All electricity exchange was planned to be carried out through the wholesale market by 2006. See Almeida (2004), for more information.

Box 3. The new model for the electricity sector

The new regulatory framework for the electricity sector has the following key features:

Electricity demand and supply will be coordinated through a "Pool" (*Ambiente de Contratação Regulado*, ACR).¹ Demand will be estimated by the distribution companies, which will have to contract 100 per cent of their projected electricity demand over the following 3 to 5 years. These projections will be submitted to a new institution (*Empresa de Planejamento Energético*, EPE), which will estimate the required expansion in supply capacity to be sold to the distribution companies through the Pool. The price at which electricity will be traded through the Pool is an average of all long-term contracted prices and will be the same for all distribution companies. All current electricity procurement contracts remain in place; therefore, each distribution company will have different portfolios of contracts. To optimize the functioning of the Pool, self-dealing (*i.e.*, the purchase of electricity by distributors from their own subsidiaries) will no longer be possible. As such, vertically-integrated companies will need to be unbundled.

In parallel to the "regulated" long-term Pool contracts, there will be a "free" market (*Ambiente de Contratação Livre*, ACL). Although in the future, large consumers (above 3 MW) will be required to give distribution companies a 3-year notice if they wish to switch from the Pool to the free market and a 5-year notice for those moving in the opposite direction a transition period is envisaged during which these conditions will be made more flexible. These measures should reduce market volatility and allow distribution companies to better estimate market size. If actual demand turns out to be higher than projected, distribution companies will have to buy electricity in the free market. In the opposite case, they will sell the excess supply in the free market. Distribution companies will be able to pass on to end-consumers the difference between the costs of electricity purchased in the free market and through the Pool if the discrepancy between projected and actual demand is below 5 per cent. If it is above this threshold, the distribution company will bear the excess costs.

The government opted for a more centralised institutional set-up, reinforcing the role of the Ministry of Mines and Energy in long-term planning. EPE will submit to the Ministry its desired technological portfolio (*i.e.*, the shares in supply of electricity produced through hydropower plants, gas-fired plants, and other renewable fuels), and a list of strategic and non-strategic projects. In turn, the Ministry will submit this list of projects to the National Energy Policy Council (*Conselho Nacional de Política Energética*, CNPE). Once approved by CNPE, the strategic projects will be auctioned on a priority basis through the Pool. Companies can replace the non-strategic projects proposed by EPE, if their proposal offers the same capacity for a lower tariff. Another new institution is a committee (*Comitê de Monitoramento do Setor Elétrico*, CMSE), which will monitor trends in power supply and demand. If any problem is identified, CMSE will propose corrective measures to avoid energy shortages, such as special price conditions for new projects and reserve of generation capacity. The Ministry of Mines and Energy will host and chair this committee. No major further privatizations are expected in the sector.

1. The Brazilian Pool differs from those in other countries (the former UK electricity pool, the Scandinavian Nordpool) because the former is based on long-term contracts, whereas in the latter case it focuses on very short-term contracts. For more information on the Nordic electricity market, see Bergman (2002). For more details on the reform in the electricity sector, see IEA (2004).

17. But the single-buyer model also has disadvantages. *First*, the government has ultimate responsibility to set priorities for new generation capacity and the country's desired energy mix and these decisions may not necessarily be the most efficient. In several countries that have adopted the single-buyer model (*e.g.*, Hungary, Indonesia, Pakistan, and Thailand), an upward bias in electricity capacity has been observed.¹¹ *Second*, this model is not well suited to deal with demand shortfalls, as prices do not reflect short-term variations in demand. As a result, although the existence of CMSE may mitigate risks, losses are mostly borne by the distribution companies because selling prices and quantities are set in advance. *Third*, because the price set by the Pool is an average of long-term contracted prices and applies to all

11. For more information, see Lovei (2000).

participating companies, all other distributors would be affected, albeit to a lesser extent, if a given market participant had financial difficulties, reflected in higher production costs.

18. Although the new model reduces market risk, its ability to encourage private investment in the electricity sector will depend on how the new regulatory framework is implemented. Several challenges are noteworthy in this regard. *First*, the risk of regulatory failure that might arise due to the fact that the government will have a considerable role to play in long-term planning should be avoided by enhancing the Ministry of Mines and Energy's technical capabilities, while insulating the new institutions from political interference. *Second*, rules will need to be designed for the transition from the current to the new model to allow current investments to be rewarded adequately. *Third*, because of its small size, price volatility may increase in the short-term electricity market. The high share of hydropower in Brazil's energy mix and uncertainty over rainfall also contribute to higher volatility in the short-term electricity market. This may in turn increase investment risk, albeit this risk will be attenuated as most investment is linked to the long-term contracts. *Fourth*, although the new model will require total separation between generation and distribution, regulations for the unbundling of vertically-integrated companies still have to be defined. Distribution companies are currently allowed to buy up to 30 per cent of their electricity from their own subsidiaries (self-dealing).¹² *Finally*, the government's policy for the natural gas sector needs to be defined within a specific sectoral framework (discussed below).

3.2. *Natural gas*

Background and main issues

19. Brazil's natural gas industry is in its infancy and has considerable potential. The share of natural gas in energy demand remains low, at about 8 per cent in 2004. Demand for natural gas is concentrated in manufacturing, particularly chemicals (32 per cent), power generation (23 per cent), iron and steel (19 per cent), and transport (12 per cent). Demand by households and the services sector is negligible, in part because of the limited need for heating in Brazil. But this may change by requiring gas infrastructure to be available in new housing, particularly in densely populated areas. Demand for gas by electricity generators may also increase substantially in the future, as part of the policy to diversify the country's energy supply mix. Another promising market segment is transport, facilitated by a rapid growth in the stock of cars fuelled by compressed natural gas (CNG).¹³

20. The expansion of demand for natural gas has so far been deterred by the fact that reserves had until recently been estimated to be low. With the discovery of new reserves, the industry is expected to become less reliant on imports, which currently account for about one-half of domestic sales.¹⁴ Moreover, transmission and distribution infrastructure is deficient, being more developed in the southern and south-eastern regions, with a smaller separate network interconnecting the north-eastern states, where production is limited. Transmission infrastructure is particularly poor in the northern states, despite the availability of natural gas reserves in the region.

21. The development of the natural gas sector is constrained by the dominant position of Petrobras, the national oil company, throughout the industry, which renders the implementation of gas projects

12. For example, CEMIG and COPEL, the distribution companies of the states of Minas Gerais and Paraná, respectively, are vertically integrated and will need to be unbundled.

13. The number of CNG fuelling stations is expected to reach to over 1 000 across Brazil by the end of 2005.

14. In 2003, the potential Brazilian gas reserves increased threefold in absolute terms as a result of Petrobras's discovery of a giant gas field in the Santos basin, off the coast of the state of São Paulo. During 1999-2002, domestic gas sales doubled to about 11 billion m³, with most of the increase being accounted for by imports from Argentina and Bolivia.

without its participation difficult.¹⁵ The gas sector was opened to private companies in the second half of the 1990s, but so far only upstream activities have attracted private-sector participants. Access to transmission lines is based on “third-party access” (TPA), requiring the pipeline operator to announce the capacity available for commercialisation every year on a non-discriminatory basis. As Petrobras has contracted almost all domestic transmission capacity, it is very difficult for competitors to enter the distribution market. So far only two companies have succeeded, after the intermediation of ANP, the industry regulator (Box 4), in obtaining TPA contracts to import Bolivian gas to its distribution subsidiaries in the state of São Paulo.

Box 4. Current regulation of the natural gas industry

There is no specific regulation for the natural gas sector, which is treated jointly with oil through constitutional provisions and specific laws adopted in 1995 and 1997. According to the 1988 Constitution, the federal government regulates the up- and midstream market segments, while states oversee gas distribution and grant concessions to distribution companies, through their regulatory agencies¹. A 1995 amendment to the Constitution and enactment of a specific law for the sector opened the oil and gas markets to private companies. Legislation enacted in 1997 created the National Energy Policy Council (CNPE), in charge of the national energy policy, and the National Petroleum Agency (ANP) which is responsible for holding concession auctions and regulating the industry.

ANP is responsible for: *i)* organising the bidding process for new exploratory blocks and signing the corresponding concessions contracts; *ii)* preparing and signing production concession contracts; *iii)* controlling the quality of gas traded; *iv)* authorising gas imports and the construction of new transmission pipelines; *v)* authorising the construction of new gas processing plants; *vi)* authorising the distribution of compressed and liquid natural gas; *vii)* setting policies for transport service tariffs; and *viii)* setting rules for promoting competition in the gas industry. However, ANP has no mandate to prepare cases for CADE, the competition tribunal, or to contest the abuse of market power in the gas sector.

1. Only 16 of the 27 (including the Federal District) states have their own regulatory agencies. Most of them have been created in the last 5 years.

22. The development of downstream markets is constrained by the territorial monopolies enjoyed by the distribution companies (mostly owned by Petrobras and in part in joint ventures with global energy players), which have been considered a necessary condition to encourage private investment in the distribution network. All states, except Rio de Janeiro and São Paulo, granted concession contracts with territorial monopolies to distribution companies for the entire period of concession (50 years).¹⁶ These territorial monopolies oblige all consumers, including gas-fired power plants and businesses, to buy gas from the distribution companies. In addition, the distributors have to buy gas from Petrobras, which currently owns most of the transmission grid, through long-term take-or-pay contracts. Because of their

15. Petrobras owns practically all the 650 billion m³ of proven gas reserves in Brazil and controls 93 per cent of the country's transmission network through its subsidiary Transpetro and its participation in TBG (operator of the Bolivia-Brazil pipeline). It is also an important player in gas commercialisation, through its subsidiary Gaspetro, being the main user of the Bolivia-Brazil pipeline, by holding the bulk of gas import contracts. Petrobras is also relatively dominant in gas distribution, as it is the major shareholder in 18 out of the 24 state distribution companies (considering non-voting share only), catering for all states except those of Rio de Janeiro and São Paulo.

16. The privatised distribution companies in the states of Rio de Janeiro and São Paulo have market exclusivity for only for part of the concession period (10 to 12 years), after which third parties are permitted to supply large consumers.

territorial monopoly, they can pass costs on to consumers, thus weakening the incentive for price competition.

23. Requirements for vertical unbundling in the gas industry are also weak, diminishing incentives for competition. Although gas transporters are forbidden to buy or sell gas, except for their own consumption, cross-ownership is allowed. The latter is also true for gas transactions between companies with at least one common stockholder. Another weakness is that the 40 per cent cap for a dominant shipper's control over new transmission capacity is only binding if non-dominant shippers demand at least 60 per cent of this additional capacity. Moreover, there has so far been little cooperation between ANP and the competition authorities.¹⁷ In particular, the competition authorities lack the technical capacity to assess anti-competitive conduct in these sectors, calling for closer cooperation with the regulator. Competition is also deterred by substantial differences in methodologies for calculating transmission tariffs, which in turn may create distortions in the final price of natural gas. In the aftermath of the 2001 energy crisis, Petrobras ended up owning most of the large gas-fired plants, having acquired in some cases its partners' equity stake.

The main challenges

24. The government has acknowledged the weaknesses of the current regulatory framework and a task force has been created to design new regulations for the gas sector. The main features of the new regulatory framework are not yet known but, from the preceding analysis, several issues should be dealt with in reforming the current regulatory framework and promote a secondary market. These are: *first*, the creation of a wholesale market for large consumers, which would foster competition between the companies that hold gas reserves and Petrobras. *Second*, third-party access to the transmission network, currently owned almost completely by Petrobras, should be granted to competing companies.¹⁸ This is a necessary condition to attract new investment in upstream activities.¹⁹ *Third*, more effective unbundling rules are essential for mitigating Petrobras's market dominance. *Fourth*, cooperation between the competition authorities and the sectoral regulator should be enhanced. In particular, ANP should be able to prepare anti-competitive conduct cases for CADE, or the capacity of SEAE and SDE should be strengthened to cover this sector. *Finally*, investment in transmission should ensure that natural gas is competitive relative to alternative energy sources, ranging from oil to hydropower.

17. See Pinheiro (2003), for more information.

18. For more information, see International Energy Agency (2003).

19. Considerable investment, totalling around USD 4 billion, is planned to expand the transmission network, both within Brazil and abroad, predominantly as part of Petrobras's *Malhas* Project. Other investments, in particular linking the northern and southern networks, will depend on the expansion of demand, in particular by electricity generators.

3.3. Oil

Background and main issues

25. The Brazilian market for liquid fuels (*i.e.*, petrol, diesel, and alcohol) is one of the largest in the world.²⁰ The industry was opened to competition in 1997, when Petrobras's monopoly was abolished, leading to the entry of about 50 companies in the upstream market. However, they did not challenge Petrobras's dominant position in oil extraction. These new companies obtained acreage either through deals/farm-ins with Petrobras or through one of the five licensing rounds that had been organised. Downstream markets, including refining and distribution, have expanded less rapidly and attracted fewer entrants relative to the upstream segment, although enjoying a long history of participation of traditional global players.²¹ Over the past decade, Brazil has become less dependent on oil imports and is likely to be self-sufficient in the near future.²²

26. The main issue in the oil sector is how to grant competitors access to refineries and pipeline networks, owned mostly by Petrobras. Petrobras's market dominance in all segments of the oil industry makes it the only supplier of information on oil production, refining, and transmission capacity of hydrocarbons. This creates strong information asymmetries in the industry that hinder ANP's ability to enforce third-party access to pipelines. As a result of the lack of coordination between ANP and the competition authorities, as in the gas sector, anti-competitive conduct is difficult to assess. Nevertheless, there appears to be increasing interest from foreign investors to build refineries that could compete with Petrobras.

The main challenges

27. The regulator could take various measures to enhance the functioning of the oil market, including to facilitate oil imports to supply prospective refinery operators.²³ At the current juncture, the focus should not be on how to increase the number of market participants, but on monitoring Petrobras, the market's dominant participant. A key challenge is to strengthen rules for non-discriminatory access to pipelines and refineries, as well as ANP's ability to enforce those rules. The creation of a secondary market for pipeline capacity and use, with the participation of producers, shippers and consumers, could contribute to enhancing efficiency without implying free riding on the large infra-structure built and financed by Petrobras. To strengthen enforcement, closer cooperation between ANP and the competition authorities should be encouraged. In downstream segments, the consistent monitoring the quality of products delivered by upstart companies in the fully liberalised distribution market and their tax compliance will also contribute to ensuring a level playing field.

28. Price regulation is another challenge. With the phasing-out of the budget's oil account in 2001, an excise-type tax was created (*CIDE-Combustíveis*) allowing the government to smooth fluctuations in

20. In 2002, there were around 200 terminals in 80 cities, 25 thousand fuelling stations, and 160 aviation refuelling points serving 14 million customers per day and around 25 million vehicles, and employing directly and indirectly around 300 thousand people. See UK Trade and Investment (2003), for more information.

21. In 2002, Petrobras produced 98 per cent of petroleum derivatives (operating 11 out of 13 refineries).

22. Brazil's production averaged 670 thousand barrels per day (b/d) in 1991 against average demand of 1.5 million b/d. In 2003, the domestic oil production had risen to 1.6 million b/d, only slightly below average demand of 1.7 million b/d. Analysts have projected that oil production may reach 2.6 million b/d in 2010. See Baker (2004), for more information.

23. See Silva and Almeida (2004), for more information.

domestic prices, while deregulating end-user prices.²⁴ In practice, however, this tax instrument has not yet been used to this end. At the same time, because it is majority-owned by the government and enjoys a dominant position in the market, Petrobras's ability to set prices can be exploited by the government in pursuance of its policy objectives, rather than the company's commercial ones. Against this background, it is important that the objective of smoothing domestic prices against volatility in international markets be pursued by using the adequate tax instrument, allowing Petrobras to set prices in line with its commercial priorities, subject to appropriate regulation, while avoiding significant discrepancies between domestic and international prices. Corporate governance mechanisms already in place have contributed to allaying concern in this area and should continue to be strengthened.

3.4. Water and sanitation

Background and main issues

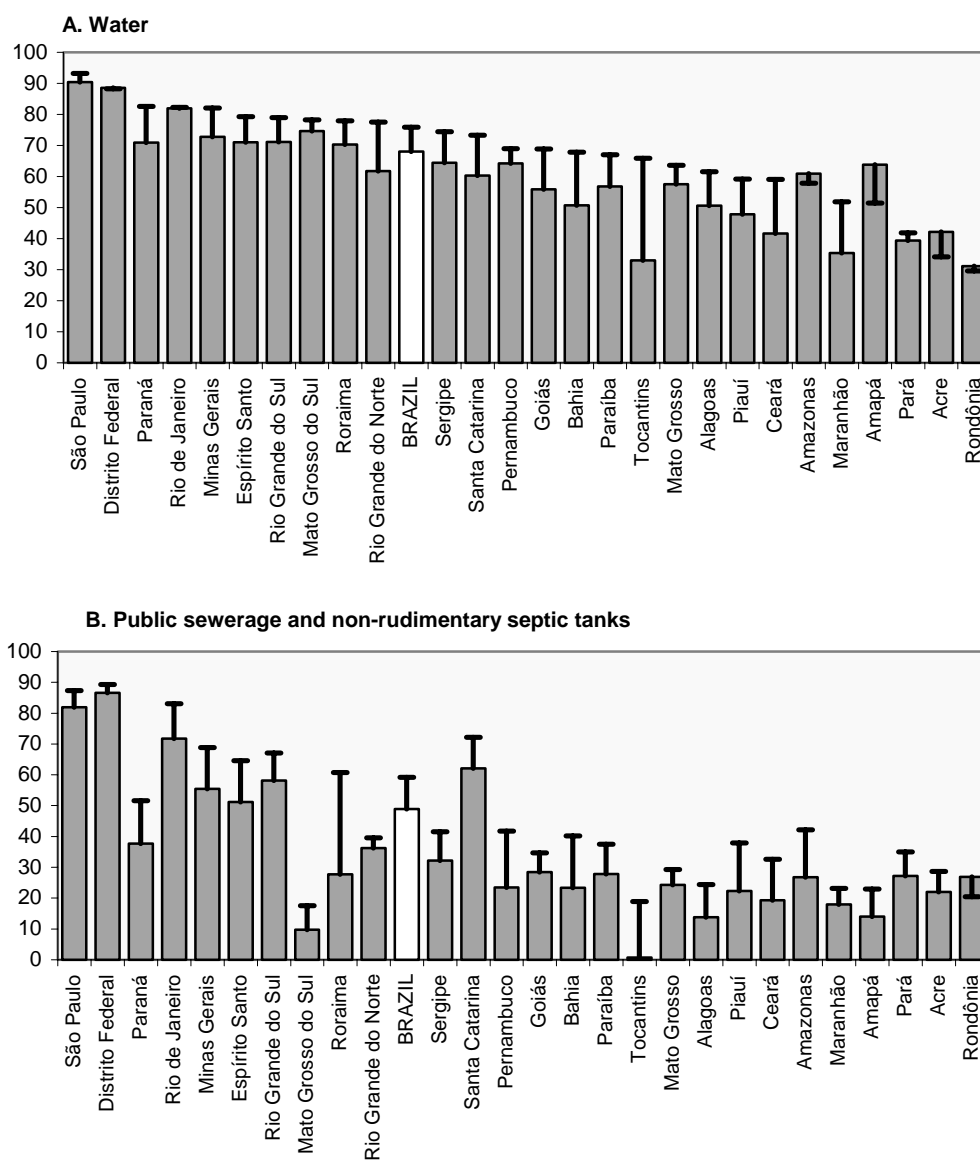
29. Important progress has been made in increasing access by the population to water, but connectivity rates to sanitation, and in particular to wastewater treatment, remains low. While about 80 per cent of households have access to piped water, less than two-thirds are connected to public sewerage networks or septic tanks (Figure 3). Moreover, there are large regional disparities in connectivity rates between the northern and south-eastern states, large and small municipalities, and rich and poor households.²⁵ In the case of wastewater treatment, progress in increasing connectivity has been particularly slow (Box 5).

24. With domestic prices set by the government, Petrobras had losses/gains depending on the discrepancy between domestic and international prices. These losses/gains used to be settled through transfers between Petrobras and the budget recorded in the so-called "oil account". With deregulation of the oil/gas market, end-user prices were liberalised gradually.

25. In 2000, connectivity rates for urban households to public sewerage and non-rudimentary septic tanks was 56 and 16 per cent, respectively, while for rural households they were 3 and 10 per cent, respectively (IBGE, 2000). Urban sewerage coverage reached 70 per cent in the South-East but only 2 per cent in the North. Only 9 per cent in poor rural areas had access to piped water in 2000, although some had access to wells and springs. Of all households earning less than two minimum wages, two-thirds had access to piped water and one-third to sewerage.

Figure 3. Access to water and public sewerage¹

in per cent of households, 1991 and 2000



1. Access rates are shown in bars for 1991 and in vertical lines for 2000.

Source: Population Census, IBGE.

Box 5. Water pollution and its impact on the environment and health

Deficiencies in wastewater treatment have important consequences for the environment and the health status of the population. Only about 10 per cent of the daily volume of water distributed in 2000 was treated and about 70 per cent of wastewater was discharged into the sea, rivers and lakes without treatment. More than one-half of municipalities use surface water to produce drinking water and one-quarter of the municipalities reported that these waters were polluted by wastewater from households or toxic waste from agriculture (IBGE, 2000). At the points of water intake of the 27 state capitals, 13 were reported to be polluted. In particular in metropolitan areas, the high degree of organic waste at the points of water intake requires increasingly more expensive treatment for producing drinking water or even renders treatment impossible. This problem not only exists in metropolitan areas but also in the semi-arid north-eastern states. Moreover, an increasing number of municipalities also face the pollution of underground sources.

Internationally comparable statistics on pollution are hard to come by. Brazilian data on BOD₅ (biochemical oxygen demand) levels are limited predominantly to the Tietê river in the metropolitan region of São Paulo. Data are also available on pollution discharges (tons of BOD per day), Q₉₅ levels, and organic discharge absorption levels, defined as the ratio of actual discharge to absorption capacity. Water pollution is concentrated in the Alto Tietê river in São Paulo and the coastal zone of Rio de Janeiro, accounting for about 20 per cent of total national pollution. Other metropolitan areas (*i.e.*, Belo Horizonte, Fortaleza, Recife, and urban areas of Goiânia) also have relatively high rates of pollution, well in excess of the levels measured in the mouths of selected rivers in OECD countries. In these areas, pollutant assimilation capacity ratios exceeded the value of 1.¹ These figures exclude organic pollution from animal and industrial waste, which are concentrated in Paraná, the south-eastern coast, and the Paraíba do Sul river.²

Polluted water also contributes to the spreading of waterborne and preventable diseases affecting in particular infants and children, although the causal links are often hard to evaluate. In 2001, there were 1.4 million registered cases of diarrhea, of which one-half in the North-east, where rates of access to clean water, public sewerage and wastewater treatment are lowest. Water pollution, the use of non-sterile water storage recipients, and the exposure to open sewers and septic tanks also contribute to the spreading of other diseases, such as dengue fever (430 thousand cases in 2001), Hepatitis A (22 thousand cases), Leptospirosis (4 thousand cases), and typhoid fever (860 cases). Clean water, sewerage and wastewater treatment could reduce the typhoid incidence by 80 per cent, trachoma and schistosomiasis by up to 70 per cent, and gastrointestinal infections and diarrhea by up to 50 per cent.³

1. Defined as the ratio of actual quantity of organic material in wastewater to the assimilation capacity of this material by water. A ratio above 1 indicates that the water is unsuitable for drinking without prior treatment.

2. See Ministry of Environment (2004) and OECD (2004c), for more information.

3. See Abicalil (2002), for more information.

30. There are considerable differences in performance indicators among the water/sanitation companies.²⁶ State companies perform poorly compared with their municipal and inter-municipal counterparts, which tend to be more profitable, despite the fact that state companies typically levy higher user charges. State companies tend to be less efficient, pay higher salaries, and have lower sewerage connectivity rates, despite having higher rates of investment.²⁷ This is at least in part due to the fact that municipal and inter-municipal companies operate in more profitable market segments, and state companies also cover rural areas, where service delivery is costlier. Water losses (*i.e.*, the ratio of volume of water

26. More than 80 per cent of the population is served by 26 state companies. In addition, there are 259 water and sewerage companies covering 4 134 municipalities. Another 230 companies are directly regulated by the municipalities, while 4 are inter-municipal companies. Only 1 state company and 15 municipal companies are private, serving 3 per cent of the population.

27. The volume of water produced and wastewater collected divided by total wage expenditure (own and outsourced personnel) of state companies was substantially below that of municipal and inter-municipal companies. The same was true for the ratio of volume of water produced and wastewater collected to operational expenditure. See Motta (2004), for more information.

billed to volume placed in the distribution system) are about the same in state and municipal companies, at about 40 per cent, although estimates vary considerably.

31. Public investment in water/sanitation has fallen over time, from 0.3-0.4 per cent of GDP in the 1970s and 1980s to 0.2 per cent during 1999-2002, and 0.1 per cent in 2003. This drop was mainly due to on-going fiscal consolidation, which affected investment spending more adversely than current expenditure, being relatively harder to retrench. Preliminary data suggests that spending levels have increased in 2004. Prior to 1994, a decline in the inflation-adjusted value of user charges also contributed to lower investment capacity.²⁸ Investment is also discouraged by the externalities associated with the provision of sewerage and water treatment services, and because water/sanitation networks are costly, investment maturities are long, and rates of return are relatively low. More importantly, the drop in public investment has not been compensated by an increase in private investment, which can be attributed predominantly to a lack of clarity about which level of government is responsible for service delivery and regulation in the sector.²⁹ This is particularly acute in the metropolitan regions, which straddle municipal borders. As a result, no regulatory framework or regulatory agency is currently available for this sector.³⁰ The National Water Agency (ANA), created in 2001, is responsible for managing and regulating surface water resources but has no purview over water/sanitation services.

The main challenges

32. To tackle the main issues raised above, a new regulatory framework proposal, which is likely to be submitted to Congress by end-2004, should contain the following elements.³¹ *First*, the framework should more clearly allocate responsibilities among all three levels of government. At the municipal level, the management of water/sanitation infrastructure should be strengthened, possibly with technical assistance by state governments in planning, fund-raising, private investment promotion, and regulatory matters. Local governments should also focus on a more efficient use of water resources, by upgrading current infrastructure to reduce water losses and non-metered water consumption. The main responsibilities of the states and federal government should be the management of water resources, through ANA, and the regulation of new investments needed to increase the coverage of water and sanitation provision.

28. See Parlatore (2000), for more information.

29. According to the 1988 Constitution, municipalities are in charge of granting concessions for “local” public services, while the federal and state governments should guarantee efficient and well-regulated water supply and sanitation services. The 1995 Concession Law provided more guidelines for private concessions but did not clarify which level of government is in charge of water and sanitation provision. The Concession law challenged the monopolies that state companies enjoyed for 25 years, stating that the municipalities also have the right to grant concessions or enter into licensing agreements for “local” services or provide these services themselves.

30. A law proposal providing a new regulatory framework for the sector, referred to as the National Sanitation Policy, was submitted in 2001 to Congress but was rejected. The most controversial issues were the assignment to the states of responsibility to grant concessions in metropolitan areas, the introduction of provisions for universal coverage and scope of services in privatization contracts, and the definition of the role of the National Water Agency (ANA). See Pinheiro (2003), for more information.

31. Discussions on a new regulatory framework have focused on options for allocating responsibilities among the three levels of government. Several proposals have been put forward, including the following main elements: broadening the scope of sanitation services to sewerage and drainage services, granting the states and municipalities more responsibility in policy formulation, creating Popular Councils at all levels of government responsible for defining policies and resolving conflict between stakeholders, and reinforcing cross-subsidisation in tariffs within regions and across services.

33. *Second*, cooperation among the municipalities should be fostered, in particular with regard to investment plans, operations and maintenance, and management and regulation of sewerage and water treatment plants. This cooperation is most important in metropolitan areas, where externalities are highest. In this context, the regulatory frameworks of some OECD countries, including France, United Kingdom, and United States (see Box 6), may provide some lessons for Brazil.

34. *Third*, the new regulatory framework would need to spell out, amongst other things, the rules for tariff adjustment, including conditions for cross-subsidisation. It is important to bear in mind that cross-subsidisation may create disincentives for efficiency and distort cost/benefit analysis for new investment. A new regulatory agency needs to be set up to enhance regulatory stability and predictability, offer conflict resolution mechanisms, and protect the private sector against expropriation risks. To this end, the option of broadening ANA's mandate to perform these functions in the water/sanitation sector could be considered, but this would require a constitutional amendment.

35. *Fourth*, particular efforts are required to encourage wastewater treatment. The experience of OECD countries suggests that water tariffs seldom fully reflect the cost of wastewater treatment. Many countries apply instead flat-rate charges or levies that vary with property value, therefore failing to discourage wasteful water consumption. OECD experience also highlights options for assuring affordability for vulnerable groups through income transfers and/or subsidisation.³² Constraints on industrial discharges have often been set on a case-by-case basis and quantitative information about the benefits of reducing pollution is rarely available.

36. Following international experience, private investment in water and sanitation could be encouraged through public-private partnerships (PPPs), discussed below. In the water and sanitation sector, various modalities of PPPs have been used in several OECD countries, ranging from concessions to full divestiture.³³ Outside the OECD area, the number of PPP projects (mostly concessions) has fallen recently, having risen steadily in the 1990s. Inadequate risk-sharing between private and public partners is an important explanatory factor for this decline, with several, poorly designed PPP contracts requiring the private operator to directly or indirectly bear political, regulatory, foreign exchange, and investment-related risks. Weak contract enforcement, macroeconomic volatility, and regulatory frameworks encouraging excessive risk-taking by private-sector partners also explain the demise of PPPs in this sector. To illustrate, currently only 3 per cent of the population in developing and emerging countries are served by private companies.³⁴ Many PPPs have also suffered from the insufficient attention paid to the social consequences of private sector involvement, such as tariff increases towards full recovery of operation and maintenance costs, without adequate social safety nets.

32. There are two broad types of policy in this area. *First*, income support measures comprise cash transfers or water service vouchers, capped tariff rebates and discounts, payment assistance, special loan facilities, and amnesties for payments in arrears. *Second*, tariff-related measures include subsidisation, capping metered tariffs for low-income consumers, and special (or "social") tariff regimes for low-income households. For more information, see OECD (2002c, 2003b, 2003c).

33. In France, water/sanitation companies are publicly owned, but management can be transferred to the private sector and regulation is carried out by the municipalities. In the United States, as in the case of many other OECD countries and Brazil, ownership can be public and private, although the public sector dominates, with state-owned enterprises often enjoy a large degree of financial and institutional independence.

34. See OECD (2003b), for more information.

**Box 6. Regulation in the water and sanitation sector:
France, United Kingdom, and United States¹**

In France, the municipalities are responsible for water supply, sewerage and wastewater treatment according to decentralisation legislation of 1982-83. Water and sanitation services are provided by the municipalities themselves or through inter-municipal consortia, and managed by the municipalities directly (through a Water Authority) or subcontracted to a private company through leasing operations or concessions. The maximum length of concession contracts is 20 years and a reduction to 12 years is under discussion, when the company returns the network and installations to the local government. Private companies cover 60 per cent of the municipalities and 75 per cent of the population, and these shares are rising. To finance public investment, the municipalities benefit from various modalities of central government assistance. Consumption is metered, and tariffs include charges on behalf of water agencies and the National Fund for Rural Water Supply. Services are sometimes liable to value added taxation. Cross-subsidization is in place in some cases.

In contrast, in England and Wales, water and sewerage companies are privately owned and managed. Upon privatization in 1989, each company was granted a license for 25 years. Currently there are 24 vertically-integrated companies with regional monopolies. The regulator, Office of Water Services (OFWAT), is an independent body. OFWAT's main objective is to set price limits that allow "well-managed companies" to finance service delivery while retaining a share of efficiency gains. OFWAT sets performance targets depending on the relative efficiency of each company. Three quarters of households are not metered, and are charged a fixed rate plus a supplement which is proportional to the estimated rental value of the property.

In the United States, water and sewerage services are handled at the local level, with federal involvement limited to environmental regulation, including water safety standards, and financing. In 1999, there were nearly 54 000 community water systems, with 85 per cent of them serving 10 per cent of the population. Private water and sewerage companies account for about 15 per cent of total water system assets. Private companies tend to specialize in water supply, rather than sewerage, in part because of federal funding for wastewater treatment plants. Private companies are subject to state regulations on tariffs, infrastructure investment, and profit controls. In contrast, private contract arrangements under public ownership are not regulated. Private participation takes various forms, including the provision of services, such as laboratory work, meter reading, chemicals supply, and operations and maintenance, and design, construction, and operation of new facilities. Outsourcing has been more common than outright privatisation. In contrast to some smaller cities, no major city has sold its utility assets in recent decades.

1. See National Research Council (2002), International Office for Water (2004), and OECD (2004*d*), for more information.

BIBLIOGRAPHY

- Abicalil, M.T. (2002). “A Atual Situação dos Serviços de Água e Esgotos no Brasil”, Unpublished document, ANA, Brasília.
- Almeida, E.L.F (2004), “Reform in Brazilian Gas and Electricity Industries: The Search for a New Model”, Unpublished Background Paper, OECD, Paris.
- Araújo, C. H. and J.C.L. Pires (2000), “Regulação e Arbitragem nos Setores de Serviços Públicos no Brasil: Problemas e Possibilidades”, *Revista de Administração Pública*, September/October.
- Baker, J. (ed.) (2004), *Critical Issues in Brazil’s Energy Sector*, James A. Baker III Institute for Public Policy, Rice University, Houston, TX.
- Bergman, L. (2002), “The Nordic Electricity Market - Continued Success or Emerging Problems”, *Swedish Economic Policy Review*, No. 9, Vol. 2, pp. 51-88.
- Djankov, S, R. La Porta, F. Lopez de Silanes, and A. Shleifer (2002), “The Regulation of Entry”, *The Quarterly Journal of Economics*, Vol. 117, No. 1, pp. 1-37.
- IBGE (2000), *Pesquisa Nacional de Saneamento Básico 2000*, IBGE, Rio de Janeiro.
- International Energy Agency (2003), *South American Gas: Daring to Tap the Bounty*, IEA, Paris.
- International Energy Agency (2004), *Electricity and Gas Sector Reforms in Brazil: Challenges to Supply Security*, IEA, Paris.
- International Office for Water (2004), *The French Public Water Management Policy*, IOW, Paris.
<http://www.politique-eau.gouv.fr/>
- Lovei, L. (2000), “The Single-Buyer Model: A Dangerous Path towards Competitive Electricity Markets”, *Public Policy for the Private Sector*, No. 225, World Bank, Washington, DC.
- Ministry of Environment (2004), *Panorama Nacional dos Recursos Hidricos*, Ministry of Environment, Brasília.
- Motta, R.S. (2004), “Questões Regulatórias do Setor de Saneamento no Brasil”, *Nota Técnica de Regulação*, No. 5, IPEA, Rio de Janeiro.
- National Research Council (2002), *Privatisation of Water Services in the United States: An Assessment of Issues and Experience*, National Academy Press, Washington, DC.
- OECD (2001), *Economic Survey of Brazil*, OECD, Paris.
- OECD (2002b), *Roundtable on Competition Issues in the Electricity Sector, Brazil*, DAFFE/COMP/WP2/WD(2002)37, OECD, Paris.

- OECD (2002c), *Social Issues in the Provision and Pricing of Water Services*, OECD, Paris.
- OECD (2003a), “The Objectives of Competition Law and Policy and the Optimal Design of a Competition Agency, Brazil”, *Global Forum on Competition*, OECD, Paris.
- OECD (2003b), “Public-Private Partnerships in the Urban Water Sector”, *OECD Policy Brief*, OECD, Paris.
- OECD (2003c), “Improving Water Management: Recent OECD Experience”, *OECD Policy Brief*, OECD, Paris.
- OECD (2004a), *Progress in Implementing Regulatory Reform in Mexico*, OECD, Paris.
- OECD (2004b), *Annual Report on Competition Policy Developments in Brazil*, OECD, Paris.
- OECD (2004c), *Environmental Data*, OECD, Paris.
- OECD (2004d), “Roundtable on Competition and Regulation in the Water Sector: The United Kingdom”, Unpublished document, OECD, Paris.
- Parlatore, A.C. (2000), “Privatização no Setor de Saneamento no Brasil”, in A.C Pinheiro and K. Fukasaku (eds.). *A Privatização no Brasil: o Caso dos Serviços de Utilidade Pública*, OECD/BNDES, Rio de Janeiro.
- Pinheiro, A.C. (2003), “Regulatory Reform in Brazilian Infrastructure: Where Do We Stand?”, *Texto para Discussão*, No. 964, IPEA, Rio de Janeiro.
- Pires, J.C.L. and M.S. Piccinini (1999), “A Regulação dos Setores de Infra-Estrutura no Brasil”, in F. Giambiagi and M. Mesquita Moreira (eds.), *A Economia Brasileira nos Anos 90*, BNDES, Rio de Janeiro.
- Pires, J.C.L. (2004), “Competition Policy and Regulation of Infrastructure Sectors in Brazil”, Unpublished Background Report, OECD, Paris.
- Silva, C.S. and E.L.F. Almeida (2004), “Targets and Challenges of the Regulatory Reform in the Brazilian Oil Sector”, paper presented at International Association for Energy Economics, Aberdeen.
- UK Trade and Investment (2003), *Oil, Gas and Petrochemical (Plant Design and Construction) Market in Brazil*, UK Trade and Investment, London.

ANNEX I.

SELECTED REGULATORY AGENCIES: ANSWERS TO A QUESTIONNAIRE SUBMITTED TO THE BRAZILIAN AUTHORITIES

	National Water Agency (ANA)	National Electricity Agency (ANEEL)	National Petroleum Agency (ANP)
1. What are the laws and ancillary legislation governing your agency? What is your agency's institutional and legal status?	Created by Law No. 9 984/00 (July 2000). Ancillary legislation is the Federal Water Resources Law (No. 9 433/97). ANA is responsible for the implementation of the Brazilian National Water Resources Policy.	Law No. 9 427/96 and Decree No. 2 335/97.	ANP was created by Law No. 9 478/97 and regulated by Decree No. 2 455/98. ANP is a special <i>autarquia</i> , linked to the Ministry of Mines and Energy.
2. Which sectors and markets are under your agency's purview?	Surface water resources (urban water supply, industries, and irrigation).	All segments of the industry: generation, transmission, distribution, and commercialisation of electricity.	The petroleum industry.

Selected regulatory agencies: Answers to a Questionnaire submitted to the Brazilian Authorities (continued)

	National Water Agency (ANA)	National Electricity Agency (ANEEL)	National Petroleum Agency (ANP)
3. According to the law, what are your agency's missions and goals? Is there any hierarchy among these goals?	<p>Implementation of the Brazilian Water Resources Policy, including licensing, price setting, technical assistance to state agencies, committees and policymaking bodies, and enforcement.</p>	<p>To provide favourable conditions for the development of the Brazilian electricity sector, with fairness among market participants and consumers for the benefit of society.</p>	<p>To regulate the petroleum industry, guaranteeing supply, promoting competition, creating an attractive environment for investment, and communicating with civil society.</p>
4. Can your agency: i) impose barriers to entry (through licenses, etc.),	<p>ANA issues licenses for the use of water resources.</p>	<p>Generators/distributors cannot hold more than 25 per cent (or 35 per cent depending on the regional market) of national generation or distribution capacity. ANEEL sets conditions for concessions. It is not responsible for issuing environmental licenses.</p>	<p>Yes, through concessions for exploration, development, and production of oil and gas; and licenses for the refining, processing, transportation, sale, and import/export of petroleum derivatives and alcohol.</p>
ii) regulate prices,	<p>Yes.</p>		<p>Limited. ANP establishes criteria for pipeline tariff setting.</p>

Selected regulatory agencies: Answers to a Questionnaire submitted to the Brazilian Authorities (continued)

	National Water Agency (ANA)	National Electricity Agency (ANEEL)	National Petroleum Agency (ANP)
iii) sanction firms for non-compliance,	Yes.	Yes, ANEEL's sanctions range from warnings to the termination of concessions.	Yes. Anti-competitive cases are dealt with by CADE.
and iv) settle disputes between market participants?	Disputes between water users are settled within three decision levels: a) River Basin Committee; b) State Water Resources Council; and c) National Water Resources Council. ANA usually has a seat in each.	Yes, through the Arbitrage Chamber.	Yes.
5. How many staff does your agency have? How many of them are lawyers/economists? What is the legal status of the staff members (civil servants, private employees, etc.)?	350 employees, of which about 20 are lawyers/economists. The great majority of employees are civil servants.	387 employees, of which 42 lawyers and 32 economists. 219 are on temporary contracts and the remainder are civil servants.	404 employees, of which 22 federal lawyers.

Selected regulatory agencies: Answers to a Questionnaire submitted to the Brazilian Authorities (continued)

	National Water Agency (ANA)	National Electricity Agency (ANEEL)	National Petroleum Agency (ANP)
6. How are your agency's Head and governing members appointed? For how long?	The governing body has 5 directors (including the agency's Head) and is appointed by the President (subject to approval by the Senate). The first term of governing body members varies between 3 and 5 years.	Board with 5 directors, appointed by the President for a 4 year, non-concomitant term.	The governing body has 1 Director-General and 4 Directors. They are appointed by the President (subject to approval by the Senate) for a 4-year, non-concomitant term.
7. How is your agency financed? What was your agency's budget in 2003?	ANA has its own budget (Federal Treasury, approved by Congress). The budget for 2003 was BRL 198 million.	0.5 per cent fee on electricity revenue of regulated entities. The budget for 2003 was BRL 86 million (excluding payroll).	ANP has its own budget (Federal Treasury, approved by Congress). It also receives a share of the royalties from auctions, fines and other revenues from services provided.

Selected regulatory agencies: Answers to a Questionnaire submitted to the Brazilian Authorities (continued)

	National Water Agency (ANA)	National Electricity Agency (ANEEL)	National Petroleum Agency (ANP)
8. List the institutions to which your agency is accountable (e.g., line ministry, legislature, General Audit Office, Ombudsman, etc.)	ANA is administratively linked to the Ministry of the Environment, and is accountable to the Federal Court of Accounts (TCU).	ANEEL has a management contract with the Ministry of Mines and Energy. Other instances: Congress, Federal Court of Accounts (TCU), Judiciary and Public Prosecutor's Office, and Internal Federal Control Secretariat. ANEEL has to fulfil the goals of the Multi-Year Plan.	Ministry of Mines and Energy.
9. What instances are there for appealing against or challenging decisions made by the regulator (e.g., court/special body/ministries). What are the grounds for appeal?	The first instance is the administrative process, within the Agency, initiated by an interested party. Other instances include the judicial (court) system.	Appeals can be made through the judicial system, starting with first-instance courts, then second-instance tribunals, superior tribunals, and finally the Supreme Court.	[complete]

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